

FLIGHT

The
AIRCRAFT
ENGINEER
&
AIRSHIPS

First Aero Weekly in the World
Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport
OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM

No. 598 (No. 24, Vol. XII.)

JUNE 10, 1920

Weekly, Price 6d.
Post Free, 7d.

Flight

The Aircraft Engineer and Airships

Editorial Offices: 36, GREAT QUEEN STREET, KINGSWAY, W.C. 2

Telegrams: Truditur, Westcent, London. Telephone: Gerrard 1828

Annual Subscription Rates, Post Free

United Kingdom .. 28s. 2d. Abroad .. 33s. 6d.*
These rates are subject to any alteration found necessary under abnormal conditions

* European subscriptions must be remitted in British currency

CONTENTS

Editorial Comment	PAGE
The Air League of the British Empire	609
Aerial Progress in Canada	610
Aerial Telephone Control	610
Honouring the Pioneers	612
Marriage of Maj.-Gen. Sir F. H. Sykes	613
The Avro Flight	614
Royal Aero Club. Official Notices	616
The Imperial War Museum	617
The Principles of the Captive Balloon. By Capt. P. H. Sumner	619
The International Aero Exhibition	622
Aeroplane Design. By Mr. G. Holt Thomas	623
Air Ministry Announcements	624
Royal Aeronautical Society Notices	625
Airships from the Four Winds	626
The Canadian Air Force	627
The Empire Air League Meeting	628
Honours	629
The Royal Air Force	630
In Parliament	630
Models	631
Sidewinds	632

DIARY OF FORTHCOMING EVENTS.

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

- June 22 ... Wilbur Wright Memorial Lecture, H.R.H. Prince Albert presiding, at 8.30 p.m., at Central Hall, Westminster. Commander J. C. Hunsaker will read a paper on "Naval Architecture in Aeronautics"
- July 3 ... Air Tournament at London Aerodrome, Hendon, in Aid of R.A.F. Memorial Fund
- July 9 to 20 ... S.B.A.C. International Aero Exhibition at Olympia
- July 17 to 31 ... Seaplane Contests at Antwerp
- July 24 ... Aerial Derby at Hendon
- Aug. 3 ... Air Ministry Competition (Large and Small Type Aeroplanes)
- Aug. 28 & 29 ... Schneider International Race, Venice
- Sept. 1 ... Air Ministry Competition (Seaplanes)
- Sept. ... International aviation week (with competitions) at Brescia, Italy
- Sept. 27 to Oct. ... Gordon-Bennett Aviation Cup, France
- Oct. 23 ... Gordon-Bennett Balloon Race, Indianapolis, U.S.A.

EDITORIAL COMMENT



WE need hardly say that we welcome whole-heartedly the formation of the Air League of the British Empire, which held an inaugural meeting at the Mansion House on Tuesday last. For the past two years and more FLIGHT has constantly urged that a real live body, similar to the Navy League, should be founded to do for the Air Service what the latter has done for the Fleet. We believe that has now been achieved, and that the Air League, which has grown out of the Aerial League, is destined to play that part and to play it worthily. The main objects to be held in view are, firstly, to educate public opinion upon the supreme importance to the Empire of air power, and to focus upon aviation, both Service and Civil, the attention of every citizen of the United Kingdom and the Dominions overseas; in a word, to carry out that propaganda among the people without which there cannot be created the essential volume of determined public opinion without which Governments cannot be moved to do things.

In its statement of aims the League very truly observes that during the War the progress of aviation was governed by naval and military demands, and the Air Force now is a factor, and will certainly become the decisive factor, of Imperial defence. It is essential, therefore, that our air power shall be developed and organised, so that it may play its part in conjunction with the Navy and the Army. Aviation is still in almost an embryo stage, and it is essential that private enterprise should receive some measure of assistance from the State in order that new types, new methods, and greater speed, economy, efficiency and safety may result, leading to improved communications between the Mother Country and the Dominions, and the creation of a great reserve of material, experience, and personnel upon which the fighting Air Service can immediately draw in time of crisis. With these premises in view, the League has as another object to support, whatever Government may be in power, in an endeavour to maintain the lead in the air, and will strengthen its hands by placing behind it a great

body of well-informed and intelligent public opinion determined that the Empire shall not lose the safety which our incomparable Navy has hitherto assured to us.

Another object of the League, with which we are in the fullest accord, is to press for a complete separation of the Air Service from any species of control by the War Office, and to reinstate the Air Ministry as a Department of State, with its own Secretary of State, Council and Service. At the same time, it advocates the creation of a *liaison* body to ensure co-ordination between all three of the Services.

These, briefly, are the principal objects with which the League has been formed, and we venture to think they are such as will commend themselves to every intelligent citizen who has given the question of air power and the future of aerial navigation more than a moment's passing thought. The League sets out, under the happiest auspices. Among those who are associated with it in one form or another are many who have been very intimately concerned with the building-up of aerial supremacy as we knew it at the end of the War. It has a very strong executive committee, and its aims are right. Much, of course depends upon the manner in which the latter are pursued, and upon how its policy is translated into action. We feel assured, however, that there will be no lack of driving-power, and that the new League is destined to become a very powerful factor in the education of the public in the need that exists for keeping our Air Force up to a pitch of efficiency and strength commensurate with the needs of Imperial defence. It has every element in its constitution making for success, and we sincerely wish it well.

Aerial Progress in Canada

Flying seems to have caught on in Canada, and to be going ahead very fast. The Canadian Air Board, with rare vision, has been quick to apply the lessons learned in the War to the needs of peace. It has established flying bases in Vancouver and at Alberta. At the first-named there is a fleet of flying-boats, to which are allotted the duties of fishery protection over the rivers and territorial waters, and of fire-patrols over the forest areas. Camp Borden, which was the principal Canadian air-training centre during the War, has been retained for similar peace-time activities, with administrative headquarters at the Air Board in Ottawa. Another flying-boat station is to be established on the shores of Lake St. John, where machines are to be used in a great prospecting scheme. A complete aerial survey of the Quebec timber-forests is to be carried out—an exceedingly interesting, and useful, development of the uses to which aircraft can be applied. Not the least interesting feature of the scheme of development is that the machines which are being used are principally those which were discarded at the end of the War as unusable surplus, and 100 of which were presented to Canada at the request of the Dominion Government, which certainly seems to have been possessed of a wider vision than our own. Another use to which these machines are being put is the aerial photography of land, which is already being carried out for the large real estate companies. It is stated that a movement is on foot to make the aerial photograph the only legal pictorial representation of land, but there are many and obvious difficulties in the way of such a scheme.

These are but a few of the directions in which Canadian aviation is forging ahead. It is probably true to say that civil flying is more advanced in Canada than it is in any other overseas Dominion, or even at home. The main factor in this seems to be that the Government has taken hold of things in real earnest, and is actively supporting and encouraging the movement, instead of merely talking about it. That is the whole difference in the position as compared with what is—or is not—being done here. In England we have to be content with pious assurances that at some time and in some shape the Government will really begin to assist the new transport to extricate itself from the initial difficulties which beset the path of all new enterprises which are imperfectly understood by the general public. In Canada the Government is acting, and leaving the talk to others.

Aerial Telephone Control

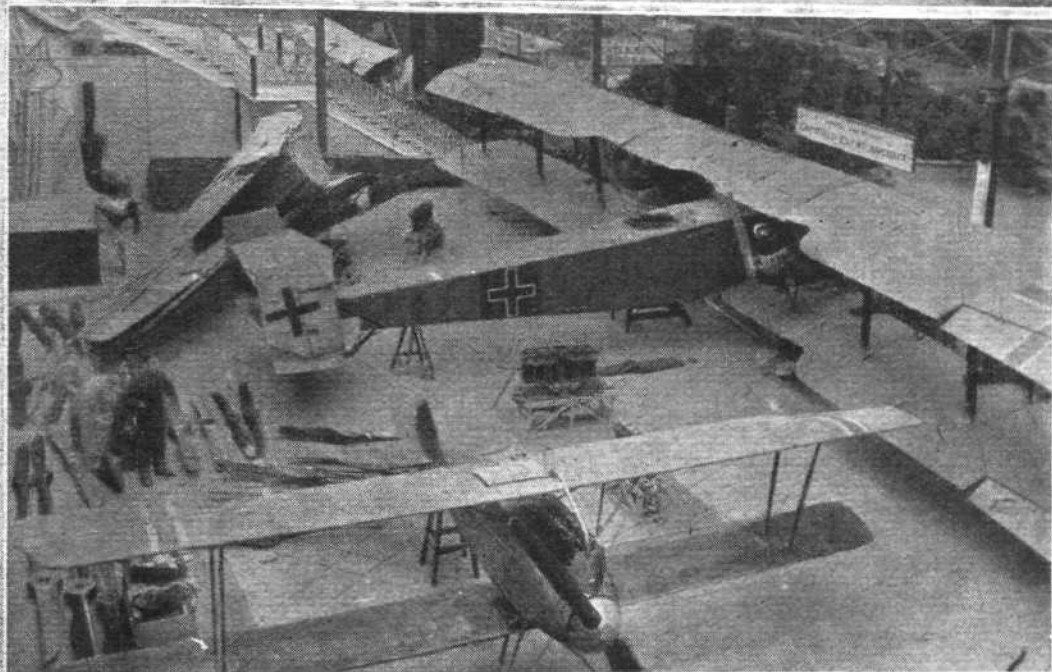
Radio-telephone stations are now in full working for the use of the London—Paris and London—Brussels air routes, so it is announced by the Air Ministry. There are stations at Croydon and Lympne on this side of the Channel. The French authorities have also established stations at St. Inglevert, Valenciennes, and Le Bourget, while the Belgian Government is going to open one at Evere, the landing ground for Brussels. A wide extension of services is contemplated for England, and stations are to be opened before long at Castle Bromwich, Didsbury and Renfrew, for the use of aircraft using the routes between London, Birmingham, Manchester and Glasgow. The wireless control of all British stations, including those licensed on private aerodromes, will be carried out at Croydon.

It is good news to hear that all this work is being done to prepare the aerial routes of the country for safe navigation. Everything depends upon the facilities for communication between flying aircraft and the ground. Unless these are present and are of the best possible nature, we might as well cease to contemplate the possibility of running commercial services at all. It is only the latest developments in wireless telegraphy and telephony that really make it possible to say that aerial transport is actually now in a position to compete on more or less level terms with older methods. The war, of course, was responsible for a great deal of wireless progress—how much has not even yet been disclosed. We know that the use of directional wireless had made great strides at the time of the conclusion of the Armistice, but great advances have been made since then, of which aviation is now beginning to reap the benefit. Then, wireless telephony, which is to the full as useful and necessary to travelling aircraft, has made as great progress and is approaching relative perfection. There seems to be no room for doubt that before long it will be possible to talk to America by wireless as easily as one can communicate between one London exchange and another over the wires. How useful wireless telephony can be to aircraft is illustrated by an incident which happened during the war, and which we do not think has been recorded in print. It concerns one of the earliest of British rigid airships, which was carrying out a flight over the North Sea within sight of the coast. It was noticed from a shore station that some thirty feet, as it turned out, of the upper keel was torn away from the structure, unknown to those in charge of the vessel. The latter were informed of the fact by wireless telephone,

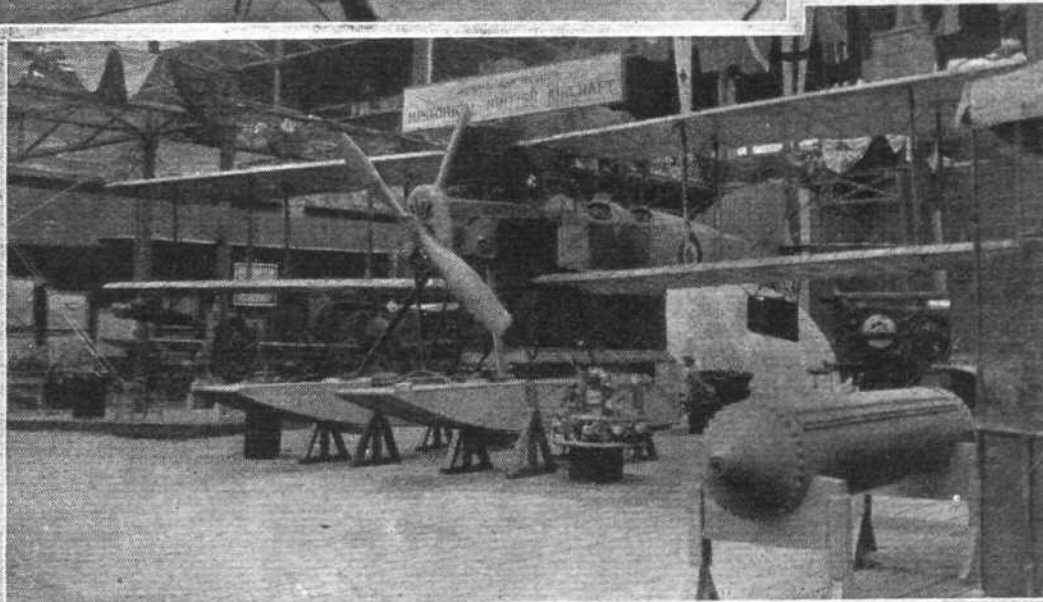
1.



2.



3.



THE IMPERIAL WAR MUSEUM, AIRCRAFT SECTION: (1) A part of the airship exhibit, showing the cars of R 29 Rigid, SS. Z 70 Non-Rigid (which sank in the Mediterranean), and a model of a Costal Non-Rigid. (2) Some of the captured German machines, a Friedrichshafen bomber, a Roland D. VI, and the remains of a Junker all-metal biplane. (3) The Short Seaplane, the one-and-only 'plane taking part in the Battle of Jutland! (See also page 617)

which was then very much in its infancy, and the ship returned safely to her shed. The distance over which the message was transmitted was rather more than thirty miles. This would be a mere nothing now, when we hear every day of wireless conversations being heard at distances of many hundreds of miles, but in those days it was rightly looked upon as a considerable advance in wireless science.

We can now confidently look forward to the time when the whole surface of the world will be covered with wireless stations for the transmission and reception of written and spoken messages, so that no one who travels need be out of touch for more than a period of hours with home and business. Even then, if he is travelling by air there will not of necessity be any "dead period"—he will be in constant touch with affairs through the marvellous wireless apparatus carried by the aircraft in which he is travelling. It is all very wonderful.

Honouring the Pioneers

Our contemporary, *Aeronautics*, is to be very greatly congratulated on the happy inspiration which has prompted its idea of honouring the pioneers of aviation in this country at a dinner to be held on the 12th of next month. Of those who are entitled to rank among the first enthusiasts who pioneered, in the best sense of the word, an infant science in which no one but themselves believed, and who risked life and money to bring it to the point at which it stands today, there are left about one hundred to receive honour at the hands of those who have followed worthily in their footsteps. Many of the original band have gone from among us. Some died as pioneers in the task of perfecting the flying machine, and in seeking a solution of the many problems with which aviation was faced until the War came to speed up research and bring it to a point of relative perfection such as we could not have visualised seven or six years ago. Others gave their lives for the country during the great struggle for freedom. Although the natural wish is that all these had been here to share in the honour to be done to their companions in the work of the pioneer, it is impossible to regard all these lives as wasted. It does not matter in what direction progress is sought, sacrifice is always asked of the seekers and is cheerfully rendered. Were it not so there would be no progress—the wheels of civilisation would stand still and mankind would remain stagnant and unprogressive. And as we regard as worthily laid down the lives of those whom we knew as our friends in the days past, we honour them in the spirit as we honour the survivors in the flesh, and they will be equally with us when we assemble next month to greet those who have done so much to advance the cause of aerial navigation in England.

It is scarcely necessary to say that we wish the function all the success it deserves—and that is a great deal. We feel, also, that the whole movement

owes a debt of gratitude to our contemporary for the exceedingly happy thought underlying its organisation.

'Varsity Flying

The words that head this paragraph are by way of being a paradox, for the reason that there is no flying at the 'Varsities! According to the *Evening Standard*, the undergraduates at Oxford, among whom are many who served as pilots in the R.A.F. during the War, are keenly anxious to start an aero club, but at present they are being forbidden by the University authorities to take any part in flying. Cambridge is rather better off, in that it actually has an aeronautical society, but up to the present only theoretical work has been done for the reason, apparently, that the Cambridge authorities, without actually forbidding it, are as much against actual flying as their fellows of the older University. In America, it is pointed out, an inter-University aeroplane race has already been carried out, but there seems to be no immediate prospect of a removal of the embargo in this country.

We confess we do not quite appreciate the reasons for this attitude of the authorities. There may be wisdom in it, but to us it seems far to seek. At both Oxford and Cambridge, as we have already noted, there are many skilled pilots in residence, and it is certainly to the class from which the average undergraduate is drawn that we must look in the future—as we have done in the past—for our best war pilots. Moreover, aeronautical engineering is finding a place in the curricula of the public schools and of those other Universities which attach more importance to the applied sciences than to the classics. Whether Cambridge, which years ago instituted engineering studies as a part of the University course, has come into line with modern ideas and taken in aeronautics we do not know at the moment. But even if it has not already been done, it will have to come, and what could be better than that advantage should be taken of the presence of men who have had long experience of war flying to inaugurate a practical course of studies? The chance will never occur again, once these war-wise flyers have departed from the Universities. Doubtless the authorities hold that the manner of their governance of the Universities is no business of the outsider, but in such a case of total prohibition of participation in a method of transport which will in the future be vital to civilisation, some clearer definition of the why and wherefore than has been given should certainly be forthcoming. The matter is not altogether a private one. On the contrary, it seems to be one of national importance, and concerns many more than the dons themselves and the undergraduates to whom their prohibition most directly applies. We quite appreciate that if flying were allowed it would have to be under very stringent regulations, but it should not pass the wit of the authorities to frame such rules as would make for safety and prevent abuses.

A Waterplane Record from America

THE speed record for hydro-aeroplanes has recently been established at Rockaway Naval Air Station by Roland Rohlfis on a Curtiss "Wasp" triplane, equipped with a pontoon float and a Curtiss 400 h.p. engine. The flight was made under official observation by the Navy, and, in four attempts over the course, an average of 138 m.p.h. was maintained. The trials were made with a cross-wind which, it is estimated, cut at least two miles an hour off the speed.

Another Trans-Atlantic Attempt

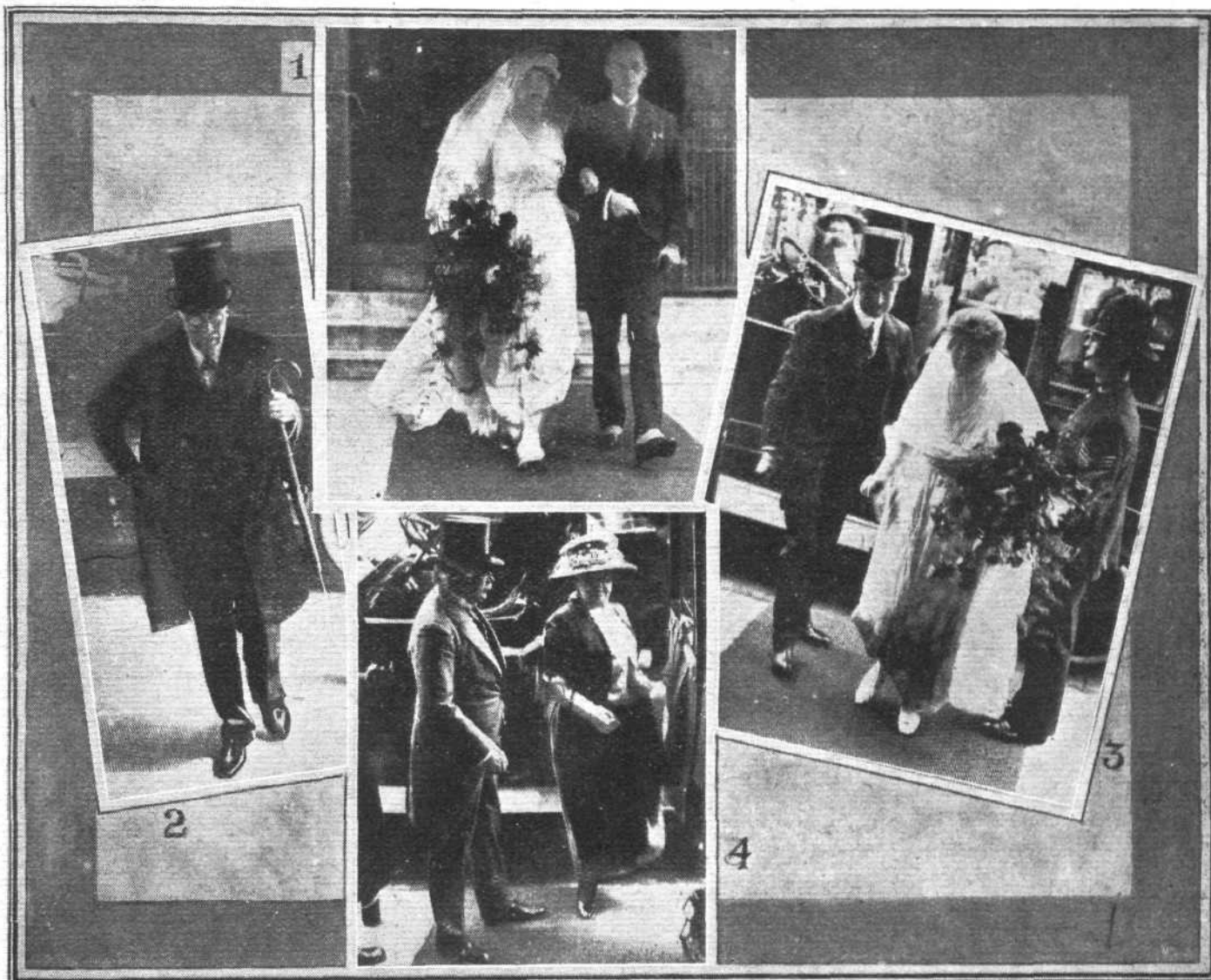
FROM Buenos Ayres it is reported that the Argentine pilot Zuloaga intends to attempt to cross the Atlantic. Starting from Palos in Spain he hopes to do the trip in the following stages and times: Palos—San Vincent, 16 hours; San Vincent—Pernambuco, 16 hours; Pernambuco—Rio, 11 hours; Rio—Buenos-Ayres, 11 hours. No particulars are available regarding the machine which Capt. Zuloaga will use in the attempt.

MARRIAGE OF MAJOR-GENERAL SIR F. H. SYKES

At St. Columba's, Pont Street, on May 3, the marriage took place of Maj.-Gen. Sir Frederick Hugh Sykes, G.B.E., K.C.B., C.M.G., Controller-General of Civil Aviation, and Miss Isabel Bonar Law, eldest daughter of Mr. Bonar Law. Considerable interest was manifested in this union, a remarkable gathering of prominent Government and Society people being present at the ceremony. The register was signed by, following the bride and bridegroom, the Prime Minister, the

first stop, in a three-seater Bristol, piloted by Mr. L. Barnard, of the Instone Air Line. Their getting away was witnessed by Mr. Bonar Law, Lady Sykes' aunt, Mr. Bonar Law, Junr., Col. Raikes and Col. Beatty, of the Air Ministry.

In somewhat misty and drizzly weather Cramlington Aerodrome, Newcastle—270 miles—was reached, after alighting at a village about two miles away to take bearings, at 6.40 p.m., and within 10 minutes Sir Frederick was in



THE SYKES-LAW WEDDING: 1. Bride and bridegroom leaving the church. 2. Mr. Balfour entering the church. 3. The bride, Miss Bonar Law, arriving with her father. 4. Mr. and Mrs. Lloyd George about to enter the church

Speaker, Mr. Balfour, Lord Beaverbrook and Mr. Rudyard Kipling.

Following the marriage, Sir Frederick and Lady Sykes returned to 11, Downing Street, where their more intimate friends joined them to see them off for their honeymoon, and wish them good luck. Appropriately the travelling to Lindisfarne (Holy Island), off the coast of Northumberland, where the Castle of Lindisfarne has been placed at their disposal for their honeymoon, was arranged to be by the Air. Leaving Downing Street by car at 1 o'clock, they drove to Croydon, whence at 2.30 they started for Newcastle, their

communication on the 'phone to Downing Street, to let them know "all's well" and "landed safely."

An ancient marriage custom was observed by the people of Holy Island, on the arrival of Sir Frederick and Lady Sykes on Thursday night. The horses were taken from the brake in which they had done the three miles journey across the sand to the island, and the brake was drawn through the village to the priory, while volleys were fired by the fishermen from guns on the boats.

Lieut. Barnard returned to Croydon on the Bristol Tourer on Friday last, the journey occupying 2 hours 8 minutes.

Helpful "Wireless"

A PRACTICAL instance of the value of the wireless direction-finder to aircraft is to hand in relation to a recent flight from Croydon to Chelmsford.

Twenty minutes after leaving, the machine spoke by wireless telephone to Croydon, reported that she was lost in a mist, and asked her whereabouts. Her position was "plotted" at Croydon by means of the Air Ministry direction-finder there; it showed the machine to be considerably eastward of her course.

This information was promptly telephoned to her, the pilot altered his course accordingly, and five minutes later again asked Croydon if he was now moving in the right direction. The information was worked out and given to him through the same means. The pilot was in this way put on his proper course for Chelmsford, which he reached safely, avoiding waste of time and petrol, with perhaps a landing miles from his destination.

It is anticipated that extraordinary progress in wireless will be made in the near future.

CROYDON TO TURIN IN 9½ HOURS

The Wonderful Flight of the Avro Baby

QUIETLY, without making any fuss about it, and for once without the glaring headlines of the daily Press, who appear to have entirely failed to realise the significance of the performance, Mr. Hinkler, flying an Avro Baby fitted with a 35 h.p. Green engine, last week flew from Croydon to Turin—the first stage of his journey home by air to Australia—in what appears to have been a non-stop flight. As announced in FLIGHT last week, Mr. Hinkler left Croydon at 4.50 a.m. He arrived at Turin at 2.21 p.m. The distance, taking into account the fact that the machine would not be able to follow the direct route, must have been in the neighbourhood of 700 miles, and as the cruising speed (average, as this would

climb above the Alps, which would be a test of any machine fitted with engines of many times the power of that of the sturdy little 35 h.p. Green. That it was accomplished is a magnificent testimony to the engine and the machine, not to mention the courage of the pilot in tackling a flight over such mountainous country where a landing, should the engine have failed, would almost certainly have had highly unpleasant results.

The Possibility of a Non-Stop Flight

On the face of it, it would not appear to be in the realms of possibility to make the flight non-stop for such a small



THE AVRO BABY : Three-quarter Front View

vary as the fuel was consumed) is about 65 to 70 m.p.h., there would not appear to have been time for Mr. Hinkler to land *en route* in order to replenish his fuel supply. It is, of course, to be taken for granted that part of the journey must have been made with a following wind, but, even so, it is almost certain that the flight must have been a non-stop one. Considering that an engine of 35 h.p. only is fitted to this splendid little machine, the performance, whether non-stop or not, must rank amongst the finest in the history of aviation. One scarcely knows which to admire most, the machine, the engine, or the pluck, determination, and endurance of the pilot.

Not the least meritorious part of the flight is the final

machine. This possibly explains the silence of the daily Press regarding the flight. Let us briefly review the figures of the machine. The wing area is 180 sq. ft., and for ordinary use the machine carries 8 gallons of petrol, or sufficient for a distance of 200 miles at cruising speed. The duration is about 3 hours. In order to cover the distance from London to Turin without a landing, it would be necessary to carry another 17 gallons or so. This would mean an extra weight of about 130 lbs. Add to this about 15 lbs. for oil, and approximately 20 lbs. for extra tank weight, and the extra load to be carried is brought up to 165 lbs. In its standard form the machine weighs 860 lbs. in flying trim. With the extra load this would be increased to 1,025 lbs. This figure,



THE AVRO BABY : Three-quarter Rear View

which is admittedly a rough estimate only, would give a wing loading of 5.7 lbs., which is certainly not excessive, and a power loading, taking the engine power at cruising speed as about 30 h.p., of 34.2 lbs. h.p., which, again, is not beyond practical possibilities. At this loading the



LONDON-TURIN: Diagrammatic Sketch Map of the Route

speed for the average machine (as shown by the speed-power loading curve in Professor Bairstow's paper) would be about 68 m.p.h., which would be sufficient, taking into account the diminution of the load as the fuel was consumed, to take the machine from London to Turin. Add to this the probability of a following wind part of the journey, and it will be seen that from a technical standpoint there is nothing impossible in the flight. So long as the engine keeps doing its work, and that is one thing which the Green engines have a reputation for doing, such a flight is certainly a practical possibility.

The Significance of the Flight

Whether or not the flight was indeed a non-stop one, it provides a practical demonstration of the potential possibilities of the small, low-powered machine. During the War it was performance at all costs which was required. For commercial and civilian aviation, however, this is not so, and it is high time this was realised. There is apparently a difficulty in getting reconciled to the idea of carrying 30 lbs. or more per h.p., due, no doubt, to the habit formed during the War of considering anything above 10 lbs./h.p. a heavy power loading. For the sake of economy in commercial aviation this habit has simply got to be broken. Not that there will not always be a demand for the fast machine also. There will, just as there is now a great demand for the fast train de luxe, but the main bulk of passengers and cargo to be carried by air will be satisfied with a far lower speed than 130-140 m.p.h. We know perfectly well that the average machine with a cruising speed of round about 70 m.p.h. can carry a load of somewhat over 30 lbs. h.p., but figures like these are not nearly so likely to convince the man in the street as is a sporting flight giving a practical demonstration. It is for this reason that the world, and especially the aviation world, should be grateful to those responsible for this splendid flight.

London to Turin in 9½ hours would have been impossible in any other vehicle than an aeroplane, and this particular flight was made, not on a machine costing thousands of pounds, and with an expensive organisation, but without special organisation of any kind and on a machine costing somewhere about £500, or the same as a light car. The running expenses of the journey cannot have been much over £6, and certainly less than £10. Actually it may be taken that the cost to Mr. Hinkler has been lower than it would have been travelling by train and boat in the ordinary way, by the time hotel and other expenses are taken into account. It would be difficult indeed to find a better refutation of the popular idea that travelling by air is and always will be an expensive luxury, and even if the courageous pilot fails in his attempt at flying to Australia, his flight to Turin will always rank among the famous flights of the years following the War. We extend to Mr. Hinkler, and to the makers of the Avro Baby, and of the Green engine with which she is fitted, our heartiest congratulations, and wish the pilot the very best of luck on the coming stages of his great flight.

FARMAN "GOLIATH" GOES FOR A WORLD'S RECORD

ONE of the famous Maison Farman "Goliath" type machines made an attempt at the world's duration record on June 3. This record, it may be remembered, is still to the credit of a German pilot, Herr Boehm, whose unofficial flight of 24 hours 12 minutes, at Johannisthal, July 11, 1914, was not, for time in the air, beaten even by the trans-Atlantic flight, which only occupied 16 hours. The French claim that the record still stood with Herr Landman (also German), with 21 h. 48 m. 45 s. (June 28, 1914). The pilots of the Farman "Goliath" were the Farman pilot, Bossoutrot, and the Salmson pilot Bernard. The 100-kilom. course flown in the attempt was Etampes, Orleans, Gidy, Etampes. The machine carried 3,300 litres of petrol and 400 litres of oil. The two pilots took watches of 6 hours each, and a small bed was provided so that the pilot not on duty might lie down to rest. The engines fitted were two Salmsons of 260 h.p.

Starting in mist at 5.38 a.m. on June 3 from Etampes, the Goliath made after the first circuit a steady pace until the end, beating the French duration record of Poulet (16 h. 23 m., April 24, 1914), Seguin's distance record of 1,021.2 kiloms. (October 13, 1913), and Fourny's speed records of 1,000 kiloms. (13 h. 1 m. 12 s., September 11, 1912) and 1,500 kiloms. (16 h. 42 m. 8 s.). After the nineteenth circuit, owing to the bad weather and a fear that their oil would give out, the pilots considered it wiser to descend, having at the finish covered 1,197 miles in 24 h. 19 m. 7 s., thus handsomely beating Landman's duration record, as well as Boehm's unofficial time, in the event of the latter being ultimately recognised by the F.Aé.I.

Owing to the moon being entirely hidden during the sixteenth tour, Bernard, who was then piloting, kept in reach of the Etampes Aerodrome for a long period. Hence the sudden jump in the time for this circuit from about 1 hour, the normal time for most of the circuits, to over 3 hours. During the day a maximum height of about 2,000 m. was maintained, and during the night 500 to 700 m.

The fuel consumption was 44 litres per hour per motor.

The following are the official times per circuit, for speed and for total duration:—

Circuit and time.*	Speed		Duration	
	Time.†	Time.†	Time.†	Time.†
—	h. m. s.	h. m. s.	h. m. s.	h. m. s.
1	1 49 55	1 49 55	1 57 2	
2	1 5 6	2 55 1	3 2 8	
3	1 7 53	4 02 54	4 10 1	
4	1 8 42	5 11 30	5 18 43	
5	1 7 33	6 19 9	6 26 16	
6	1 4 50	7 23 59	7 31 6	
7	1 4 47	8 28 46	8 35 53	
8	1 1 39	9 30 25	9 37 32	
9	1 0 40	10 31 5	10 38 12	
10	0 58 51	11 29 56	11 37 3	
11	1 1 2	12 30 58	12 38 5	
12	1 1 42	13 32 40	13 39 47	
13	1 0 18	14 32 58	14 40 5	
14	0 58 24	15 31 22	15 38 29	
15	1 10 46	16 12 8	16 49 15	
16	3 7 10	19 49 18	19 56 25	
17	1 14 29	21 3 47	21 10 54	
18	1 6 35	22 10 22	22 17 29	
19	1 4 51	23 15 13	23 22 20	
Duration total, 24 h. 19 m. 7 s.				

* 100.88 kiloms.

† Time of passing in flight over the starting line.

‡ Time from taking off.

America After Records

FROM Hartford, U.S.A., it is announced that Leo Mons, piloting an aeroplane with six passengers, flew on May 31 from Atlantic City to Philadelphia and back (120 miles) in 59 minutes 39 seconds.

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

FORTHCOMING EVENTS

July 3	1920.	..	..	Air Tournament at London Aerodrome, Hendon, in aid of R.A.F. Memorial Fund.
July 9-20	..	..	..	Sixth International Aero. Exhibition at Olympia.
July 17-31	..	..	..	Aeronautical Meeting, Antwerp.
July 24	..	..	..	Aerial Derby, at London Aerodrome, Hendon.
Aug. 28-29	..	..	..	Jacques Schneider Cup, Venice.
Sept. 8, 9 and 10	..	..	..	Fédération Aéronautique Internationale Conference, Geneva.
Sept. 27-Oct. 2	..	..	..	Gordon-Bennett Aviation Cup, Paris.
Oct. 23	..	..	..	Gordon-Bennett Aeronautic Cup, Indianapolis.

ROYAL AERO CLUB AVIATION MEETINGS

The Royal Aero Club has made arrangements with the Grahame-White Co., Ltd., for the use of the London Aerodrome, Hendon, for Aviation Meetings during the current year. Members will be admitted free to these Meetings on production of their Club Membership Card. The first Meeting, the Aerial Derby, will be held on Saturday, July 24, 1920.

SIXTH INTERNATIONAL AERO EXHIBITION, OLYMPIA, JULY 9-20, 1920.

Inventions and Model Section

The Royal Aero Club has undertaken the organisation of the Inventions and Model Section of the Sixth International Aero Exhibition which will be held at Olympia, July 9-20, 1920, and the Club will be glad to receive entries for this Section.

Anyone with inventions or models appertaining to aircraft is requested to communicate with the Secretary, Royal Aero Club, 3, Clifford Street, London, W.1.

FLYING SERVICES FUND

A Meeting of the Flying Services Fund Committee was held on Friday, June 4, 1920, when there were present:—Group-Capt. C. R. Samson, C.M.G., D.S.O., R.A.F., in the Chair, Lieut.-Col. A. S. W. Dore, D.S.O., Mr. Chester Fox, Squadron-Leader T. O'B. Hubbard, M.C., R.A.F., and the Secretary.

Applications for Assistance.—Twenty-one applications for assistance were considered, and grants and allowances voted amounting to £242 17s. 6d.

"DAILY EXPRESS" £10,000 PRIZE FLIGHT TO INDIA AND BACK.

The following letter has been received from the Air Ministry:—

"In continuation of Air Ministry letter dated 13th ultimo on the above subject, I am commanded by the Air Council

to state that a letter has been received from the Foreign Office expressing the definite opinion that any flight by British airmen involving passage over territories in Asia Minor and Syria would, in present political conditions, be most injudicious, and might well lead to serious embarrassment. The Air Ministry has, therefore, decided that in the circumstances the competitive flight to India organised by you cannot for the time being be allowed to take place.

"I am to request that you will be good enough to inform all intending competitors accordingly."

ROYAL AERO CLUB

FIRST RACE MEETING, 1920

AERIAL DERBY

(Under the Competition Rules of the Royal Aero Club and the Regulations of the Fédération Aéronautique Internationale.)

AT THE

LONDON AERODROME, HENDON, N.W.

(By arrangement with the Grahame-White Co., Ltd.)

SATURDAY, JULY 24, 1920, at 3.30 p.m.

PRIZES

The following Cash Prizes will be presented by the Royal Aero Club:—

Fastest Time	..	..	..	£500
Handicap	..	..	1st Prize	£250
Handicap	..	..	2nd Prize	£100
Handicap	..	..	3rd Prize	£50

REGULATIONS

QUALIFICATIONS OF COMPETITORS.—The Competition is open to persons of any nationality holding a licence issued by any Aero Club affiliated with the Fédération Aéronautique Internationale.

ORGANISATION.—The Competition shall be conducted by the Royal Aero Club under the Competition Rules of the Royal Aero Club and the Regulations of the Fédération Aéronautique Internationale.

ENTRIES.—The entry fee is £10. This fee together with the entry form must be received by the Royal Aero Club, 3, Clifford Street, London, W.1, not later than 12 noon on Wednesday, July 14, 1920.

COURSE.—The Course is approximately 200 miles, and will consist of a double circuit of London, starting from the London Aerodrome, Hendon, with the following turning points:—

Brooklands Aerodrome, Weybridge.
Epsom.
West Thurrock.
Epping.
Hertford.

Offices: THE ROYAL AERO CLUB,

3, CLIFFORD STREET, LONDON, W. 1.

H. E. PERRIN, Secretary.

Croydon-Amsterdam Air Service

In our issue of May 20 we dealt editorially with the inauguration of the above service—the first service to Holland. We referred to the active part to be taken in this enterprise of Aircraft Transport and Travel, Ltd. On the other hand, the greatest praise is due to the Dutch Company, which is co-operating in this undertaking, and it is with much pleasure that we learn that the flights from Holland to England are on account of this company—Koninklijke Luchtvaart Maatschappij voor Nederland en Koloniën—to whom we now give full credit for their share in the work.

Amsterdam-London Air Service

THE Lord Mayor of London has received the following letter, dated May 17, from the Burgomaster of Amsterdam:—

"Dear Lord Mayor,—The citizens of Amsterdam thank you very much for your letter, which I received today by air express. This proof of sympathy from your lordship is highly appreciated by the municipality of Amsterdam.

I concur with you in the belief that a regular air service will go far to assist in increasing the mutual relations existing between our two cities. Therefore, I sincerely hope that the British and Dutch navigation companies may have great success in establishing this new and most important means of communication between the two countries.—I am, yours sincerely, TELLEGEN, Burgomaster of Amsterdam."

Holland to Help

MR. TRUFFINO, one of the Dutch postal officials at Amsterdam, is leaving for England to discuss matters in connection with the proposed postal service between England and the Netherlands.

Johannisthal to Reopen

FROM Germany it is reported that an attempt is to be made to restore the Johannisthal Aerodrome at Berlin to its pre-War status as the Hendon of Germany. The Deutscher Luft-Loyd Gesellschaft is advertising for personnel for running the aerodrome, and it is stated that from the beginning of next month exhibition flights will be made.

THE IMPERIAL WAR MUSEUM

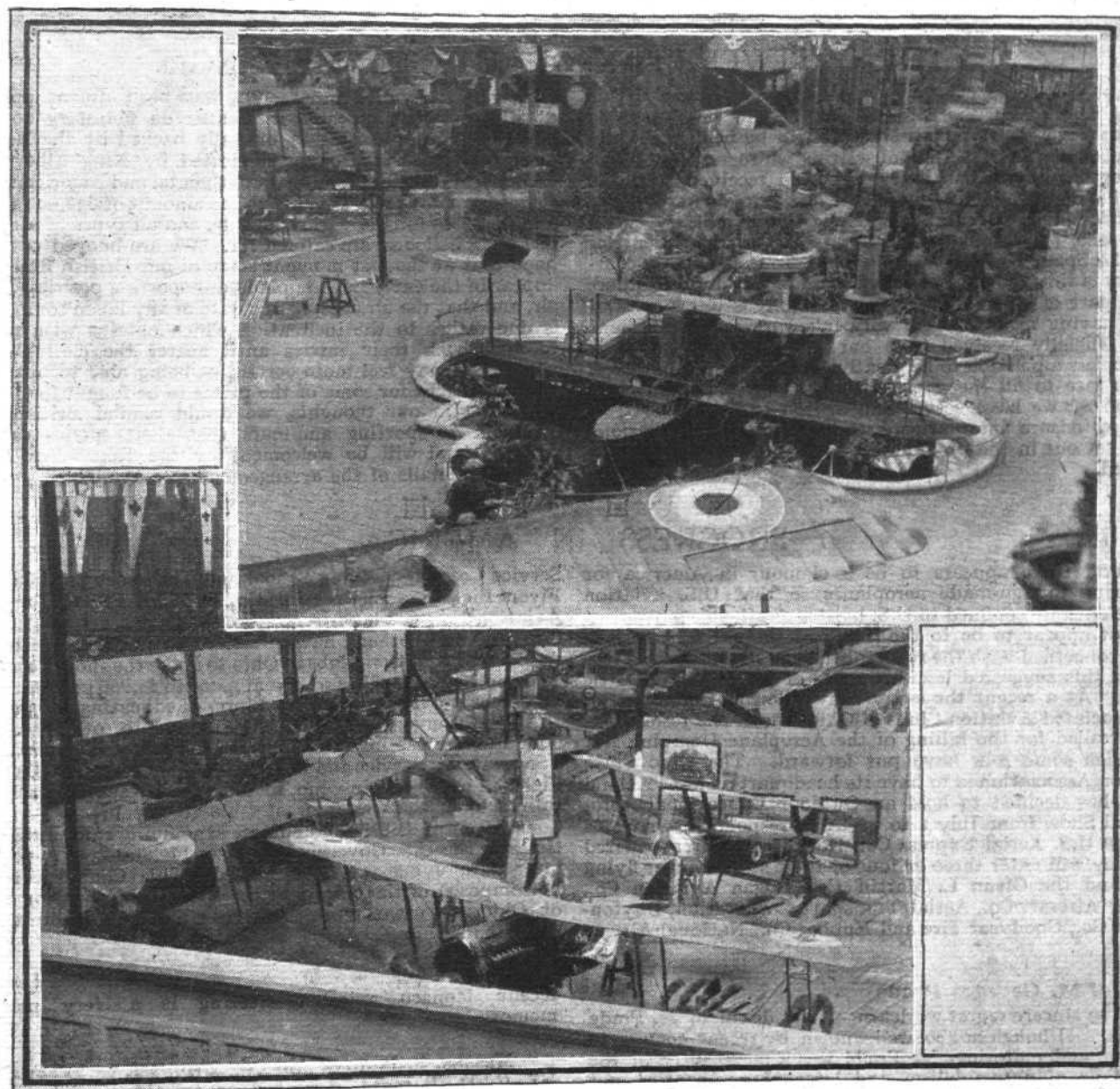
As far as the Aircraft (or Royal Air Force) section is concerned, the Imperial War Museum, now open at the Crystal Palace, is, perhaps, the most complete collection of its kind we have ever seen. The phenomenal development of aircraft in all its branches during the War is, practically speaking, now laid bare—complete in almost every detail—from start to finish. Although, of course, this development is due to the exigencies of war, the strides that have been made in aviation, apart from any connection with war, are also apparent.

To give a full description of the exhibits would be an interminable task, and we do not propose to attempt it. We will, however, briefly outline the nature of some of the more striking items. As regards aeroplanes, there are examples, both full-sized and scale models, of practically all the types used during the War, from 1914 up to the Armistice. Amongst the full-sized machines may be mentioned a B.E. 2c. used for the defence of London against air raids, a Sopwith Camel on which Lieut. Culley shot down a Zeppelin, the Short seaplane that took part in the Battle of Jutland—by-the-way, we seem to be rather proud of the fact that it was the one-and-only 'plane, judging by the prominent "advertising" on this point! Another interesting machine is the Parnell Panther "Ship's Plane," from which one of the types of floatation gear may be studied. A Norman Thompson Training flying boat reposes gracefully

on one of the ponds in the centre of the exhibit. There are also several examples of German aircraft, including a Friedrichshafen G. III. bomber of fairly recent date, a Roland D. VII. with boat-like built fuselage, and the remains of a Junker all-metal biplane. Amongst the other German exhibits must be mentioned a balloon, the envelope of which is made up of British shirting, which we kindly supplied via neutral countries!

At the time of our preliminary visit, the airship exhibits were not completed, but we understand that here also the progress in this section may be studied directly. Complete full-sized airships are, of course, not shown, but parts of various types, and scale models, together with diagrams, are to be seen. There are also numerous items connected with the building, navigating, mooring, and "living on board" of airships, as well as many relics of captured or destroyed Zeppelins.

But perhaps the most interesting display, and one where the technical enthusiast may spend hours—if not weeks—is up in the gallery. Here are examples, diagrams, etc., of every type of instrument and accessory, from the earliest and crudest used in the opening stages of the War to the latest (or nearly so) type. In the armament section, for instance, are seen the double-barrelled shot guns, and revolvers as first used, and then stage by stage to that wonderful piece of mechanism, the interrupter gear now used in conjunction



"Flight" Copyright

THE IMPERIAL WAR MUSEUM, AIRCRAFT SECTION: Some British machines—At the top the Norman Thompson flying boat in its element; and below, an R.E. 8, Sopwith Salamander, Sopwith triplane and Bristol Fighter.

with machine guns. There are also bombs of all types, bomb sights and release gears. The different types of instruments displayed reminded us of our recent visit to the Aircraft Disposal Co.'s Depot at Croydon! Last, but not least, are the Photographic and Wireless sections, and, although these may appeal more to specialists in each particular case, the extraordinary progress made during the last four or five years is particularly marked, rendering the subjects exceedingly interesting. Arrangements are being made whereby actual demonstrations of wireless telephony as applied to aircraft will enable the visitor to learn much about this latest and most wonderful of all inventions. Besides all the various items enumerated above, there are

a large number of very interesting "relics," such as capture German maps used on raids, clothing and other articles worn by well-known airmen, members of the Intelligence Department, etc., whilst the progress of aircraft during hostilities is further depicted in an extensive collection of pictures and photographs.

As for the rest of the exhibits, apart from those connected with aircraft, our interest was so sustained with the aircraft section, we have not as yet found opportunity of seeing what these are, but we understand that both Sea and Land is as thoroughly represented as is the Air—in which case one can only conclude by saying that the Imperial War Museum as a whole is "Some" Museum.

AIR MINISTRY AIRCRAFT COMPETITION ENTRIES

ENTRIES from the following firms, it is announced by the Air Ministry, have been received for the Air Ministry Competitions for large and small aeroplanes to be held at Martlesham Heath, commencing on August 3:—

Large-Type Aeroplanes

1. Aircraft Manufacturing Co., Ltd.
2. Aircraft, Transport and Travel, Ltd.
3. Central Aircraft Co.
4. Handley Page, Ltd.
5. Vickers, Ltd.

Small-Type Aeroplanes

1. Aircraft Transport and Travel, Ltd.
2. Austin Motor Co., Ltd.
3. William Beardmore and Co., Ltd.
4. Bristol Aeroplane Co., Ltd.
5. Petters, Ltd. (Westland Aircraft Works).
6. A. V. Roe and Co., Ltd.
7. Sopwith Aviation and Engineering Co., Ltd.

Intending Competitors for the Seaplane (Amphibian) Competition, to be held at Martlesham Heath (land trials) and Felixtowe (water trials), commencing September 1 next, are reminded that entries for this competition close on July 1.

THE ANTWERP AERONAUTICAL MEETING

As announced some time ago, when full particulars of this meeting were given, the aeronautical meeting in connection with the Seventh Olympian Meeting will be held from July 17 to 31 next. At the time of writing we regret very much to note that no British entry has been received. On the other hand the French have already put forward three competitors, viz.:—(1) S.E.A. (Henry Potez, military type), (2) Morane, (3) Breguet, with a promise of further entries from the Spad, Farman and Nieuport firms. What a commentary is this upon the enterprise and bid for foreign orders on the part of Great Britain! It certainly is but a natural result, having regard to the very lukewarm encouragement so far officially received from our Government. But it is nevertheless a position to be greatly deplored. It is, however, not too late to fill the gap. Although entries should close on June 15, we have very strong reason to believe that, in order to ensure international competition in the various events set out in the programme, several days' grace can be arranged.

A very elaborate programme has been drawn up, the details of which appeared in *FLIGHT* on February 26 last, page 234. The meeting is officially backed by the Belgian authorities, and is strongly supported by King Albert and an important list of prominent Continental and American men. Prizes for aeronautical events to the amount of 630,000 francs are available for the various events, and all types of aircraft, including balloons, are catered for. We are buoyed with the hope that at the last moment some of our British firms will appear in the entry list to uphold our sporting position in the air, and that the absence at this date of any home competitor is due rather to the inclination which obtains with many, to hold back their entries until nearer the closing date, when they may feel more certain of being able to put up a successful fight for some of the prizes to be fought for. And with that in our thoughts, we would remind British constructors or sporting amateurs that their entries can be received (and will be welcomed) by the Royal Aero Club, where all details of the arrangements are available.

PROGRESS IN AMERICA

ALTHOUGH there appears to be a clamour in America for hampering foreign-made aeroplanes so that U.S. aviation may be entirely confined to U.S. built aircraft, this movement does not appear to be to the liking of the entire American public concerned with the realm of the air. In Cleveland it is evident this suggested ham-stringing of progress finds little favour. At a recent three-day convention at Columbus, of the Associated Aviation Clubs of Ohio, one of the resolutions passed called for the killing of the Aeroplane Dumping Act Bill which some folk have put forward. The Ohio State Aviation Association is to have its headquarters at Cleveland and it has decided to hold an Outdoor Educational Aeronautical Show from July 2 to 7. A correspondent writes us that the U.S. Aerial Express Co., Detroit, has already wired that they will enter three or four of their 20 passenger flying boats and the Glenn L. Martin Co., Logan Aviation Co., Weaver Aircraft Co., Aerial Transport Corporation, Dayton-Wright Co., Goodyear Tire and Rubber Co., National Airway

Service Co., Ohio Flying School and Transport Co., Sherrick Flyers Inc., Aero Engineering Co., Superior Flyers, Johnston Aviation Co., Crader Aircraft Co., and Continental Aircraft Co., and many others, have promised to co-operate with the Associated Aviation Clubs of Ohio to make the show a success. The aim is to actually carry from 5,000 to 10,000 persons in the air—thus providing a practical form of educating the public.

At the Convention previously referred to, other business done was the passing of resolutions calling for the creation of a Separate Air Service and Establishment of Municipal Landing Fields in every city in Ohio, in addition to a special resolution calling upon the Governor of Ohio to appoint an Aviation Commission to get up and enforce sane flying rules until such times as the U.S. Government passes Federal laws governing inter-state flying was also passed. This Commission will be composed of the officers of the Associated Aviation Clubs of Ohio and two representatives from manufacturers of aircraft in Ohio.

Death of M. Georges Prade

WITH sincere regret we learn of the death of M. Prade in Paris. Although not so well known by recent comers to aviation and motoring, M. Prade was a personality in the early days of automobilism, and later of aeronautics, not easily forgotten. Originally his electrical energy was devoted to *Le Journal* and *l'Auto*, later to be transferred to *Les Sports*, founded for him. At the closing down of the latter he concentrated his efforts upon *Le Journal*, of which he was sporting editor. His figure at the

recent Monaco aviation meeting is a very pathetic memory.

A Disclaimer

MESSRS. S. INSTONE AND Co., LTD., ask us to state that Mr. C. D. Barnard, described as an airman, who stands charged with the manslaughter of Alfred Sharp by knocking him down whilst driving a motor, is no connection or relation of the commodore of their air line, Mr. F. L. Barnard, late R.A.F., and who piloted Sir F. H. Sykes upon his honeymoon journey.

THE PRINCIPLE OF THE CAPTIVE BALLOON

With a Reference to its Application for the Mooring of Airships

By CAPTAIN P. H. SUMNER, A.M.I.N.A.

THE Drachen and Caquot observation balloons are the direct descendants of the old spherical balloon used for spotting in the early days of military aeronautics. The success of the modern observation balloon is due to the more careful study of stability of the aerostat under various wind conditions.

A knowledge of all the forces acting on a captive aerostat must be considered, and is today comparatively easily

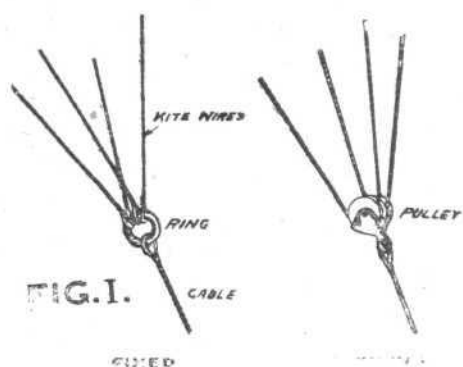


Fig. 1.—Fixed and running point of attachment

obtained by the use of the wind channel and the application of dynamics. Stability is maintained on the Caquot balloon in winds up to 80 m.p.h. It was not possible to fly the old spherical balloon on a cable in winds of even 20 m.p.h. Flying in the higher wind speeds is accomplished and primarily

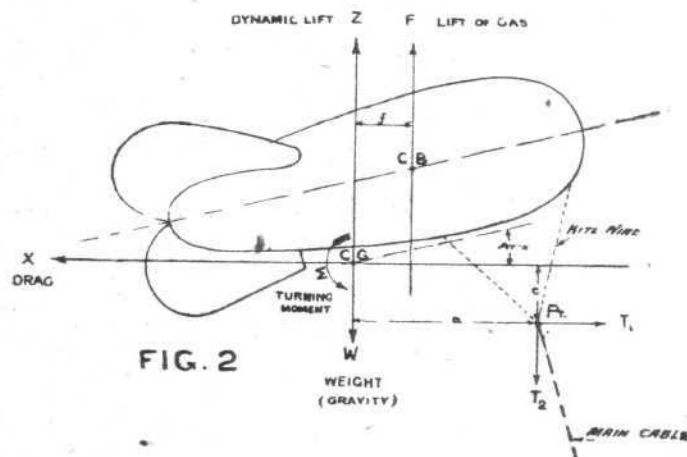


Fig. 2.—Forces on the captive balloon

due to two things, the position of the cable attachment on the balloon and the provision of ample stabilising surface in the shape of planes, or their equivalent. The main cable from the balloon winch is attached to the balloon by four lengths of wires placed in pairs at a position well forward. These wires are known as kite wires, or more generally as the "Metallic Vee." All four wires or legs are in the form of a vee and terminate at a point some distance below the balloon. This point is termed the "point of attachment," being the point where the mooring cable is secured.

The position of the point, and whether it is a fixed or running point, greatly determines the success of the principle. By a running point is meant the wires are made to run through a pulley.

In determining the equilibrium conditions of the balloon, all the forces acting are considered. These forces are the wind forces, lift of gas within the balloon, and gravity. The forces can be resolved to two forces only, acting in opposite directions at any point chosen on the balloon and a moment obtained at the chosen point. It is usual to resolve the forces in a plane about the centre of gravity, but any point may be chosen with the same result for the purpose of equilibrium.

Fig. 2 shows the direction of forces on the balloon. The conditions of these forces are to be expressed by the equation $M + Ff + T_1c - T_2a = 0$, the condition of longitudinal equilibrium for the balloon with fixed kite wires.

In order to clearly understand the various forces and their direction the following is given:—

M is a moment about the centre of gravity, due to the wind tending to tilt the nose up and so twist the balloon back around the C.G. in the direction of the arrow shown in the diagram. Its value is obtained from the model in the wind channel.

F is the value of the gas force lifting the balloon vertically upwards through the centre of buoyancy, the centre of the lifting effort of the gas.

T_1 and T_2 are the force components in the main cable. T_1 being the horizontal force and T_2 being the downward force.

a and c are leverages from the C.G. at which T_2 and T_1 act.

f is the leverage from C.G. at which F acts.

The drag force on the balloon tending to blow the balloon backwards on a horizontal path is designated X . The value of this force is obtained on the model in the wind channel.

The dynamic force Z due to the wind lifting the balloon vertically upward is also obtained from the wind channel experiments on the model.

The force component T_1 , or the forward pull in the cable will be exactly the same value as the drag force X .

The force component T_2 , or downward force in the cable will equal the upward forces F plus Z , less the weight of the balloon W .

The value of F is easily obtained from the lift of the gas contained in the balloon, and at the desired altitude—each thousand cubic feet of gas being equal to 68 lbs. lift. The loss of lift will be about one-thirtieth of the gross lift every thousand feet increase of altitude.

In Fig. 3 are given the values of the various forces on the

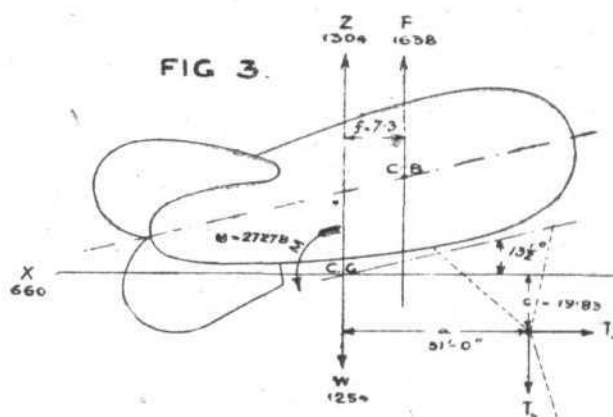


Fig. 3.—Force values and stable equilibrium

balloon, such a balloon being in stable equilibrium at the wind speed of 40 m.p.h. The equation for longitudinal equilibrium is as follows:—

$$M + Ff + T_1c - T_2a = 0$$

$M = 27,278$	$T_2 = F + Z - W$
$Ff = 1,638 \times 7.3 = 11,957$	$= 1,638 + 1,304 - 1,254$
$T_1c = 660 \times 19.83 = 13,088$	and $T_1a = 1688 \times 31$
$= 52,323$	$= 52,328$

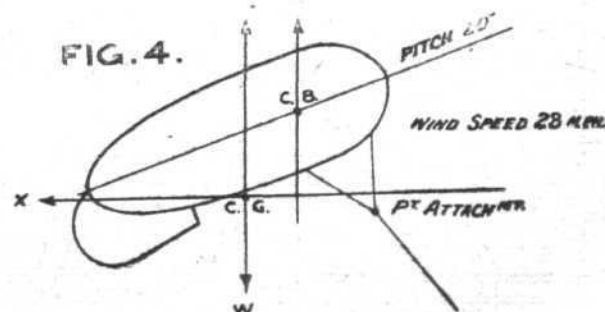


Fig. 4.—Condition of balloon fitted with rudder only

It is important to differentiate clearly between equilibrium and stability. Although forces and moments may be balanced up in the equation for equilibrium conditions, statical stability is required to maintain the balanced conditions under disturbances such as sudden rise of wind

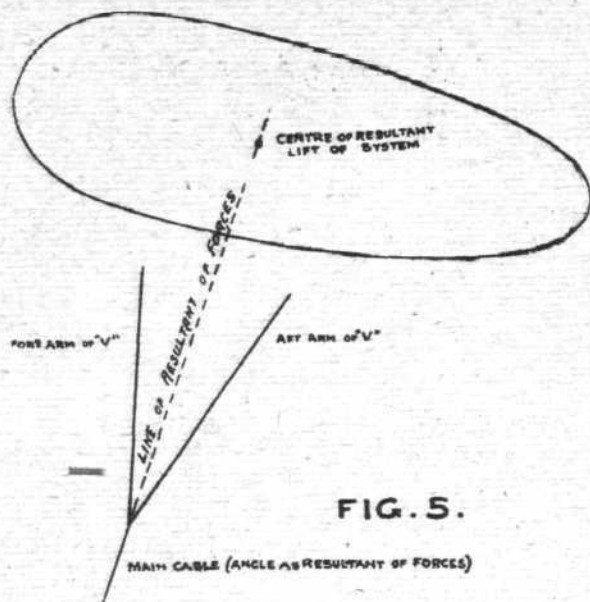


FIG. 5.

Fig. 5.—Cable angle as resultant of forces.

pressure acting on the nose of the balloon. Lateral stability is maintained on the Caquot balloon by the use of a large air-inflated rudder; the same applies to the Drachen balloon, but in addition this balloon is assisted in lateral stability by a tail of parachutes.

The condition of stable equilibrium of the Caquot balloon shown in Fig. 3 is maintained in the higher winds by the efficiency of the large horizontal air-inflated stabilisers.

The moment M , or wind action tilting the balloon backwards, is counteracted by the large dynamic force under the horizontal stabilisers or tails, longitudinal stability being obtained.

Both the inflated rudder and inflated stabilisers perform the same duties as planes, but although less efficient than the

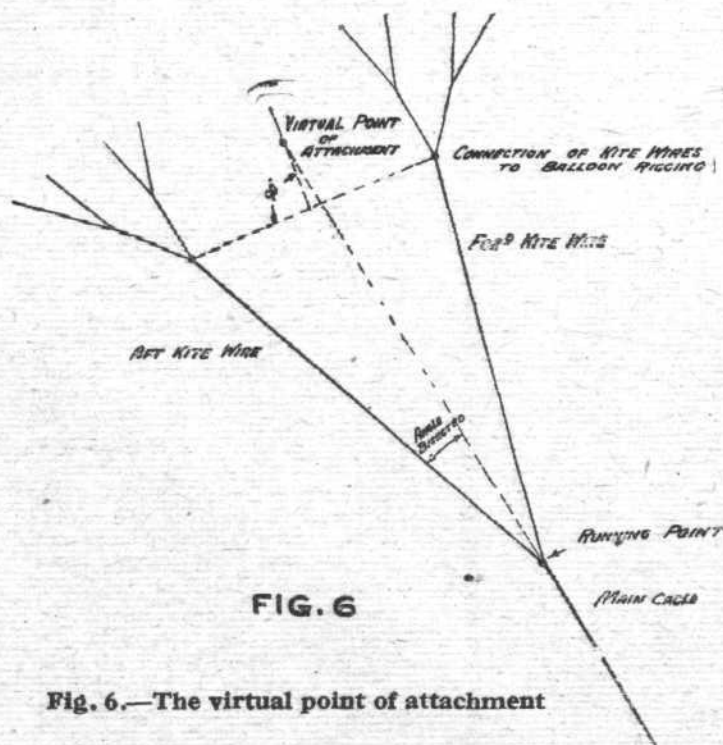


FIG. 6

Fig. 6.—The virtual point of attachment

latter, are more suitable, inasmuch as planes are liable to be easily damaged in the work called upon from kite balloons.

The Drachen balloon relies on sails for assistance in longitudinal stability.

For the matter of interest, Fig. 4 shows the condition of a balloon fitted with rudder only.

It is to be noted that the values of the dynamic lift and

drag force, the weight of balloon, and moment about C.G. will necessarily differ from the balloon shown in Fig. 3, separate values of the forces on the two models being obtained from the wind channel.

The forces and moments on the balloon fitted with rudder only will be found to balance up in the equation when the pitch angle of the balloon is 20° and wind speed 28 m.p.h.

The angle of pitch is excessive, producing such a high tension in the cable as to be liable to break it.

In the stabilised balloon (Fig. 3) the angle of pitch is brought down to $13\frac{1}{2}^\circ$ in a wind speed, as high as 40 m.p.h. Such a balloon will have sufficient stability to regain balance after any disturbance, and moreover a much smaller tension will be put on the main cable ensuring a greater factor of safety and due to the low pitch angle.

In deducing the equilibrium conditions of any captive balloon, the method of procedure is to tabulate at different wind speeds a range of angles together with the drag, dynamic lift force and moment about C.G. obtained in the wind channel and corresponding to the angles. The total moments in the equations will be either plus or minus, the point where the sign changes, or where there is no difference in the moments on either side of the equation, being the balanced condition.

It is apparent that the leverages of the various forces about the balloon will affect conditions of balance. The different angles of pitch of the balloon will shorten or lengthen the distance any one force acts. The leverage a , at which the

FIG. 7.

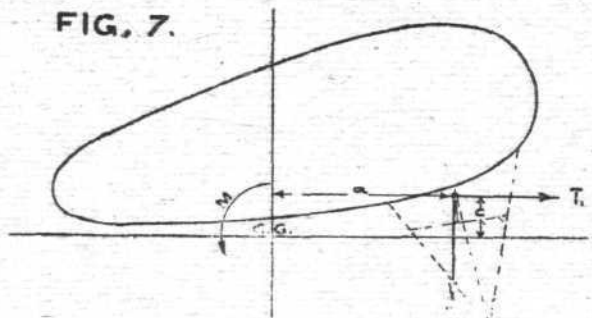


Fig. 7.—Action of forces T_1 and T_2 consequent upon virtual point.

downward force component T_2 of the main cable acts, is 31 ft. (Fig. 3) at $13\frac{1}{2}^\circ$ pitch of balloon. At 20° pitch (Fig. 4) this distance is 33 $\frac{1}{2}$ ft. from the C.G., making a marked difference in the foot-pound or moment.

In a similar manner should planes or stabilisers be placed as far aft as possible or otherwise increasing the leverage at which they act, the less will be the area required. The longitudinal position of the point of attachment on the balloon should be such that the path of the main cable (which will lie as the angle of the resultant of the forces T_1 and T_2) if produced would exactly pass through the centre of the resultant lift of the whole system. See Fig. 5.

The kite balloon envelope is of a streamline shape, designed to give a centre of buoyancy well forward, thus throwing the centre of lift of the whole balloon in such a forward position as to permit conditions required for stability of the captive aerostat. Further, the point of attachment being placed well forward gives a greater leverage for the rudder in swinging the balloon back to head to wind position after yawing.

In the two examples given of the equilibrium conditions of the kite balloon, the point of attachment chosen has been what is termed "fixed." If a "running point" is given to the balloon the conditions of the forces are now somewhat different. The running point will put the point of attachment slightly further aft by reason of the virtual point. Fig. 6 shows the method of locating the virtual point of attachment.

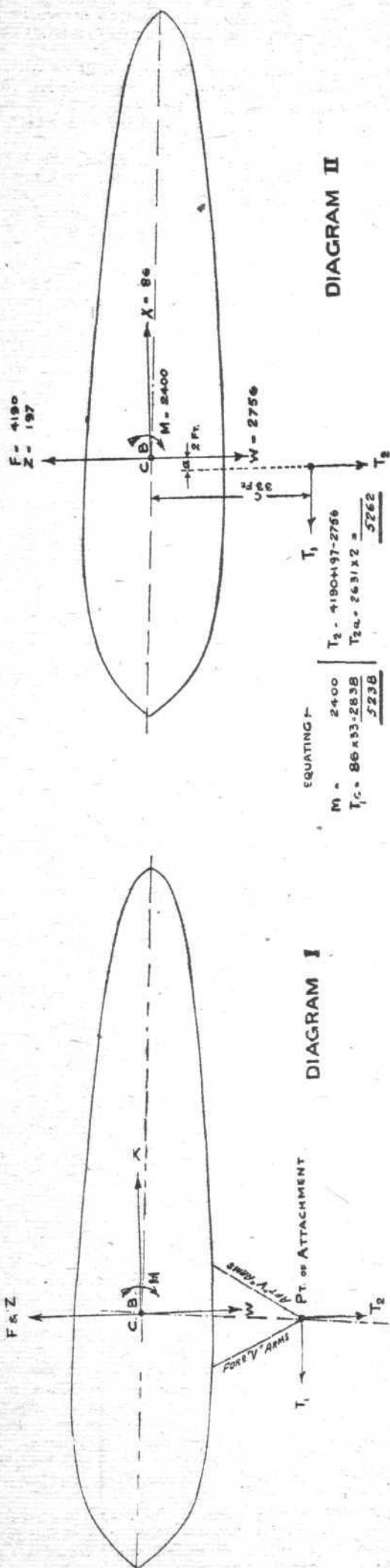
In Fig. 7 is given the position of the new point in relation to the C.G. of the balloon.

The direction of the force T_1 gives now a negative moment, opposing M , by reason of its position above C.G. The equation for equilibrium $M + Ff + T_1c - T_2a$ therefore becomes $M + Ff - T_1c - T_2a = 0$ when running wires are used.

The forces and moments will be balanced up with due consideration of the new action of the forward force T_1 , and consequent alteration in the lengths of the leverages a and c .

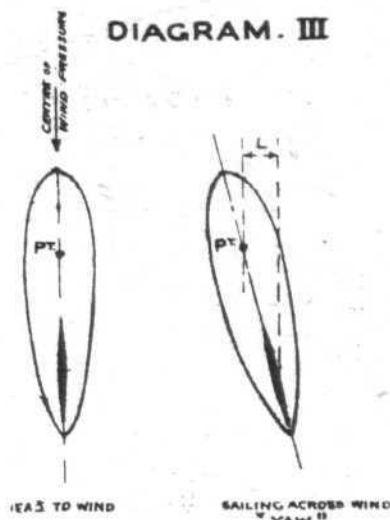
A running point of attachment on the balloon considered here will be found to give a less successful result than the "fixed" balloon.

Having now set out some of the points essential for the stability of the captive balloon, it is proposed to give as a preliminary measure an outline of what would be required for mooring an airship on similar lines.



The metallic "V" method would certainly suggest simplicity.

The problem of mooring and towing airships has received a great amount of attention. Mooring and towing may be considered one and the same problem; both evolve stability



of the envelope whether stationary or moving. Towing will produce an air current flowing past the balloon, at a speed of the towing ship or mobile winch, over and above that of the wind current.

In applying the principles of the captive balloon to that of mooring an airship, a small ship, similar to the Naval "Blimp" type has been taken, and from this example, some observations for the successful mooring of airships by this method can be obtained.

Airships have been moored successfully to a mooring mast, and have in some cases ridden out gales, but the procedure is always attended with the danger of breaking away. In ordinary winds, however, the mooring mast is perfectly safe. The advantages of a system similar to the captive balloon is that the airship could be towed both from the land or sea.

In determining the stability of the ship when moored, all the forces acting must be considered. By the application of dynamics these forces can be resolved to two force components at right angles acting at any point, and a moment obtained in the manner as given previously for the kite balloon. In the case of the airship, the centre of buoyancy has been chosen for resolving the forces. The condition for longitudinal equilibrium being expressed by the equation $M + T_1 c - T_2 a = 0$, where

M is a moment about the C.B., due to the wind tending to tilt the nose up.

T_1 is the horizontal force component in the mooring cable.

T_2 is the vertical force component in the mooring cable.

a is the leverage from C.B. at which T_2 acts.

c is the leverage from C.B. at which T_1 acts.

Diagram I shows the direction of the various forces about the airship, and where F is the gas force lifting the balloon vertically upwards or the static lift; Z is the dynamic lift of the ship; X indicates the drag force; W equals the weight of the complete ship acting vertically downwards.

The values of M , X and Z are obtained from experiments on the model in a wind channel.

T_1 or the horizontal force in the cable will equal the drag X . T_2 or the vertical force in the cable will equal $F + Z - W$.

In diagram I is inserted also, an approximate position for the metallic V and point of attachment. The direction of the resultant cable force necessarily cutting the centre of buoyancy or approximately the centre of net lift of the airship. The leverage of the forces T_1 and T_2 are factors determining the equilibrium condition. According to whether these are shortened or lengthened, moments in the equation can be balanced up and a position of the point of attachment arrived at.

Diagram II shows the conditions for longitudinal equilibrium in a wind of about 28 m.p.h. with the ship at 4° pitch. The gross lift of the ship or the value of F has been taken at 4,190 lbs. The weight of the ship complete has been taken as 2,756 lbs. The values of M , X and Z are obtained from the model experiments at the pitch angle of 4° .

The leverages a and c are arranged in order to balance up, or nearly so, the equation, the point of attachment being

therefore determined as far as the balancing up of the moments are concerned for equilibrium conditions.

It should be mentioned that the airship, although not shown in the diagrams, is fitted with the usual planes, i.e., two fixed horizontal planes with elevators and fixed vertical plane with rudder.

The observation balloon, being designed with a fairly bluff nose, places the centre of buoyancy of the envelope well forward over the winch suspensions, and where the resultant force in the cable cuts the centre of nett lift of the balloon system.

The airship with a much finer streamline gives a centre of buoyancy rather more aft compared with the observation balloon. The disposition of the weights of an airship in flight call for a more central position of the centre of buoyancy or at a position somewhere about the line of the centre of gravity.

In providing for the equilibrium conditions of the airship when captive, it has been found necessary therefore to place the point of attachment in a position much farther aft com-

pared with the kite balloon. Such a position aft does not allow of a satisfactory stable condition. Taking lateral stability, diagram III shows the airship in plan view. It will be noticed that a poor leverage is obtained for the action of the rudder plane in swinging the ship head to wind or to counteract "yaw." Similarly, this applies to longitudinal stability. The point of attachment is therefore too far aft.

The conclusions drawn show that large rudder or plane surface will be required on the airship consequent upon short leverage of their action when the ship is moored. Possibly a new design of envelope may be required, giving a centre of nett lift well forward, the more forward the better, and the less will be the area of the planes required. Successfully mooring or towing an airship in high winds by the metallic V method will necessarily be at the expense of a slight amount of efficiency of the ship in normal flight, but this loss could, no doubt, be reduced to a minimum by the use of trimming ballonets, or some alteration of the centre of gravity of the airship when in flight and in the captive state.

INTERNATIONAL AERO EXHIBITION

Olympia, July 9-20, 1920

ALLOTMENT of stands has now taken place, and the following is a complete list of exhibitors to date:—

Stand No. SECTION A.—Aircraft

- 66 AUSTIN MOTOR CO., LTD., Longbridge Works, Northfield, Birmingham.
- 65 BEARDMORE, WM., AND CO., LTD., Parkhead, Glasgow.
- 64 BLACKBURN AEROPLANE AND MOTOR CO., LTD., Olympia, Leeds.
- 59 BRISTOL AEROPLANE CO., LTD., Filton House, Bristol.
- 46 BRITISH AERIAL TRANSPORT CO., LTD., 38, Conduit Street, W.1.
- 43 MARTINSYDE, LTD., Maybury Hill, Woking, Surrey.
- 49 PAGE, HANDLEY, LTD., Cricklewood, N.W.3.
- 62 POTEZ, HENRI, 96, Avenue Victor Hugo, Aubervilliers, Seine, France.
- 63 A. V. ROE AND CO., LTD., 166, Piccadilly, W.
- 44 SHORT BROS. (R. AND B.), LTD., Whitehall House, Charing Cross Road, W.C.
- 42 SOPWITH AVIATION AND ENGINEERING CO., LTD., Canbury Park Road, Kingston-on-Thames.
- 45 SUPERMARINE AVIATION WORKS, LTD., Donnington House, Norfolk Street, W.C.
- 50 VICKERS, LTD., Vickers House, Broadway, Westminster, S.W.
- 61 WESTLAND AIRCRAFT WORKS, Yeovil, Somerset.

SECTION B.—Aero Engines

- 51 ARMSTRONG-SIDDELEY MOTORS, LTD., Coventry.
- 52 DUDBRIDGE IRONWORKS, LTD., Stroud, Gloucestershire.
- 55 GWYNNE'S ENGINEERING CO., LTD., Hammersmith Ironworks, W.6.
- 54 LA HISPANO SUIZA, Rue du Capitaine Guynemer, Bois-Colombes, Seine, France.
- 57 D. NAPIER AND SON, LTD., 14, New Burlington Street, W.1.
- 53 ROLLS-ROYCE, LTD., 15, Conduit Street, W.
- 56 SUNBEAM MOTOR CAR CO., LTD., Moorfield Works, Wolverhampton.

SECTION C.—Propellers, Models, Components and Accessories

- 32 AUTOMATIC TELEGRAPH CO., 20, Shaldon Mansions, 132, Charing Cross Road.
- 4 AEROFILMS, LTD., The London Aerodrome, Hendon, N.W.
- 12 ANGLO-AMERICAN OIL CO., LTD., 36, Queen Anne's Gate, Westminster, S.W.
- 37 BOURNEMOUTH AVIATION CO., LTD., Evesbury Park Aerodrome, Bournemouth.
- 26 BREGUET, LOUIS, SOC. ANON., 115, Rue de la Pompe XVI^e, Paris.
- 25 BRITISH CELLULOSE AND CHEMICAL MANUFACTURING CO., LTD., 8, Waterloo Place, S.W.1.
- 76 BRITISH EMIALLITE CO., LTD., AND GENERAL AERONAUTICAL CO., LTD., 5, Hythe Road, Willesden Junction, N.W.
- 6 BRITISH THOMSON HUSTON CO., LTD., Lower Ford Street, Coventry.
- 83 BRITISH WRIGHT CO., LTD., 9, Galen Place, Bury Street, W.C.1.

- 7 BROWN BROS., LTD., 22-34, Great Eastern Street, E.C.
- 28 BRUNTONS, Musselburgh, Scotland.
- 18 BULLIVANT AND CO., LTD., 72, Mark Lane, E.C.3.
- 82 CELLON (RICHMOND), LTD., 22, Cork Street, W.1.
- 79 CHANCE BROS. AND CO., LTD., Lighthouse Works, Smethwick, Birmingham.
- 9 D.A.P. AERO CO., 185, Replingham Road, Southfields, S.W.18.
- 29 FALCON AIRSCREW CO. AND D. M. DAVIES, 113, Cottenham Road, Holloway, N.
- 40 FIRTH, THOS., AND SON, LTD., 8, The Sanctuary, Westminster, S.W.
- 33 GENERAL ACCIDENT FIRE AND LIFE INSURANCE CORPORATION, LTD., General Buildings, Aldwych, W.C.
- 72 GLACIER METAL CO., LTD., Waldo Road, Willesden, N.W.
- 89 HOBSON, H. M., LTD., 29, Vauxhall Bridge Road, S.W.1.
- 27 HOYT METAL CO. OF GREAT BRITAIN, LTD., Deodar Road, Putney, S.W.15.
- 38 JONES, A. E., LTD., 52, High Street, New Oxford Street, W.
- 1 KENT, GEORGE, LTD., 199, High Holborn, W.C.1.
- 8 MARCONI'S WIRELESS TELEGRAPH CO., LTD., Marconi House, Strand, W.C.
- 85 NORTH AND SONS, LTD., 14, Soho Square, W.
- 80 ODDY, W. D., AND CO., Globe Road, Holbeck, Leeds.
- 14 OWEN, JOSEPH, AND SONS, LTD., 199A, Borough High Street, S.E.1.
- 15 PALMER TYRE, LTD., 119, Shaftesbury Avenue, W.C.2.
- 86 PALNUT CO., LTD., 6, Great St. Helens, E.C.
- 34 PARNACOTT, A. E., Penge Lane, Penge, S.E.20.
- 5 PRICE'S CO., LTD., Belmont Works, Battersea, S.W.11.
- 31 RIPAULTS, II, King's Road, St. Pancras, N.W.1.
- 98 ROBINHOOD ENGINEERING WORKS, LTD., Putney Vale, S.W.15.
- 81 RUBERY OWEN AND CO., Darlaston, South Staffs.
- 97 SAMUEL BROS., LTD., 65, Ludgate Hill, E.C.4.
- 30 SERCK RADIATORS, LTD., Warwick Road, Greet, Birmingham.
- 96 "SHELL" MARKETING CO., LTD., 39-41, Parker Street, Kingsway, W.C.
- 75 SIMMS MOTOR UNITS, LTD., Percy Buildings, Gresse Street, W.
- 91 SMITH, S., AND SONS (M.A.), LTD., 179, Great Portland Street, W.1.
- 87 SKEFKO BALL BEARING CO., LTD., Skefko Works, Luton.
- 90 TELEPHONE MANUFACTURING CO., LTD., Martell Road, West Dulwich, S.E.21.
- 39 TITANINE, LTD., 175, Piccadilly, W.
- 3 VACUUM OIL CO., LTD., Caxton House, Westminster, S.W.1.
- 13 VICKERS, LTD., Vickers House, Broadway, Westminster, S.W.1.
- 88 WAKEFIELD, C. C., AND CO., LTD., Wakefield House, 30-32, Cheapside, E.C.
- 84 WELLWORTHY, LTD., Stanford Road, Lymington, Hants.
- 77 YORKSHIRE STEEL CO., LTD., 30, Holborn, E.C.
- 41 FLIGHT, 36, Great Queen Street, Kingsway, W.C.2.

Active Air Operations

In the Reds *versus* Poles fighting it is reported that aerial fighting is playing an increasingly important part in the fighting. Warsaw reports that aeroplanes supported

the troops in repelling strong forces of the enemy in the north, while in the Ukraine an airman bombed and put out of action an armoured train, the third thus disposed of in two days.

AEROPLANE DESIGN, GERMAN CAPACITY, AND OUR EMPIRE'S FUTURE IN THE AIR

BY MR. G. HOLT THOMAS

AGAIN Mr. Holt Thomas has issued a well-timed warning through *The Times* to those on high, who for the time being hold the future of the British Empire in their hands. It is well they should take heed and save, even at this late hour, the little still left of the magnificent monument of efficiency built up during the War, by our great pioneer aircraft constructors and the huge organisation brought about by the five years of fighting. The day of reckoning will else surely come and it will be a proud moment for those now shutting their eyes to the inevitable future, when they have to explain what they did after the War to take full advantage of the insistent lessons of the War in the Air.

Mr. Holt Thomas's points are many and most of them absolutely unanswerable except in the terms "Let the thing be done" and at once. The following is the text of Mr. Holt Thomas's latest protest:—

"In aeronautics in this country things are happening below the surface which are disquieting. While one still hears of the weakening of design departments which helped Britain to air supremacy, news is to hand at the same time of bold and active progress in German aeroplane design.

"We are allowing to drift into other occupations, and lose touch with flying, men who helped to design the craft which won us the aerial War. Germany, on the other hand, is doing everything possible to retain such brains at their vital task.

"Take one practical example. It is generally agreed—it is, in fact, self-evident—that commercial aeroplanes must now enter upon an era of metal construction. Machines of wood and fabric are too frail for regular commercial use. Now we in this country have designers with as practical a grasp of this question as could be desired. But there is already this very marked difference. While they are discouraged by apathy and a lack of interest, and by a sheer absence of money, the German designer is being encouraged. Already in German aircraft works plans are coming to fruit for huge metal machines which, even should they develop defects, will still mark most significantly a new step forward in design; machines which do away with all fabric, wood, and wires, and are of such size and strength that it is stated that it will be possible to accommodate mechanics actually inside their planes in order to control the running of the motors attached to these planes. German design is busy, too, with metal hulls for big seaplanes; also with the problem of grouping six or eight motors in a central engine-room.

"The need for turning out vast numbers of aeroplanes is, for the time being, over. It is not quantity, but quality, we now require. We want aeroplanes which are the fastest, the safest, the most economical, and the most durable. Above all, we must encourage design—and particularly design in new fields.

"The German responds faithfully to an idea. Once the seed is in his mind, it grows and flourishes. The Germans are, in fact, *en masse*, ideal from the point of view of national propaganda. Before the War, in Germany, unlike this country, there was no difficulty in rousing public interest in flying, as shown by the fact that there were more than 1,000,000 members of the Air Fleet Union, which is now being revived; and as instanced again when the late Count Zeppelin, coming to grief financially at the end of some of his early experiments, the public subscribed him more than £300,000 in a surprisingly short space of time. The flame is there—it has always been there—and it is easily fanned.

"I think that, in a sense, this is our greatest menace. The German, as a citizen, has always been genuinely interested in flying. But the man in the street in this country has not. He has liked, to a certain extent, to read about it; to talk about it also in a desultory and half-incredulous way; but what it is so difficult to make him realise even now, as a practical concrete fact, is that the air is really to be the high-speed medium of the future, and that it is for us, with possessions throughout the world, to be up and doing.

"The German citizen thirsts always for some rallying cry, some good imagination-stirring 'slogan.' What better than 'Germany's future is in the air?'

"We must never forget how, though those of us who knew spared no effort, we went into the War far less prepared aurally than the Germans. And does one's experience since the Armistice make one reassured as to the new contest between nations in commercial aeronautics? Hardly.

"But there is no need to become an alarmist. If we are beaten in the race for air power it will be entirely our own fault, and we shall deserve no sympathy. All I say is that there is

this definite fact looming more clearly every day on our horizon. Germany looks largely to the air for her rehabilitation. The idea is already in the minds of the far-seeing among her citizens that she may gain her ambitions in the end by becoming mistress of the air. It is no good to smile at such ambitions, or call them childish. If we do, we may wake up one morning and find the chimera has become stern reality.

"I may be permitted, perhaps, to recall that as far back as 10 years ago, without any commercial interest in flying, or any intention of having any, I was preaching the vital necessity for this country, for its own protection, to take a practical interest in the navigation of the air. Today, having severed entirely my connection with the aircraft industry, I am in the same unbiassed position; and I say that the necessity for public interest in flying is, at the present time, a thousand times greater than it was 10 years ago. Then I remember, I was asking the Government to spend a small sum in order to keep the aircraft designing power of Britain ahead of other nations. To-day the defences of the country are costing hundreds of millions a year; but, even after the lessons of the use of aircraft in the War, the relative values of Navy, Army, and Air Force are not appreciated. A sum much smaller than that suggested for new uniforms for the Army would be sufficient to preserve for us our power of aircraft design; and, regarded merely as a form of national insurance, it would be cheap at the price. Let us remember this. The danger of the future is aerial invasion; and hundreds of millions spent on Navy and Army will not protect us against it.

"So far as the present position is concerned it is not one incident or fact which means so much. It is the cumulative effect of a series—the general atmosphere. So far as flying is concerned ours—with exceptions which prove the rule—is an atmosphere of reaction and lassitude, combined with heavy frowns from the Treasury when the spending of a small sum of money is even hinted at. A pilot who has just returned from an aerial tour throughout Britain reports civil aerodromes deserted, and an air of stagnation which is most depressing.

"Yet Germany, having gone through a vast crisis, having faced the worst, turns hopefully to this new era of the air—like a man who, escaping with his life from some desperate illness, faces with a new zest a fresh page in his career. So, one may say, is Germany turning to the air.

"We used to say, towards the end of the War, that, of course, it would be essential, in the post-war period, that a number of British firms who had come into aviation during the War should revert to their former trades. That was reasonable. But what we did not anticipate was that actual designing firms, firms with the names and reputations of pioneers, would have to disperse their staffs. Yet this is what has happened. And it is not right.

"We came through all right aurally in the War because we were given time. It was this which saved us. We had a breathing spell during which we could make up our leeway. But it will not be so again. All future strategy, relying on the development of air war, will be aimed at great crushing blows and quick decisions. A nation unprepared will be lost.

"In German aeroplane design, since the end of the War, it is not so much the actual work itself as the spirit of enterprise in which it is conceived. German designers have placed their fingers on the very spots which matter. It is in just those directions where new experience is so valuable that they are pushing and probing.

"At present there is a glut of surplus war aeroplanes. They are, many of them, quite unsuitable for commercial use; they represent a sort of stop-gap. It would be better in a way, if it were economically possible, to burn the lot. But while they are being used up design is going ahead. The real commercial aeroplane is taking shape. And the country which does eventually produce the best will dominate the aerial highways of the world.

"We have no grievance against Germany for striving to dominate air traffic. The world starts commercial flying with a clean slate. It is the newest thing. It is completely in its infancy. Nobody knows anything really about it yet. It is the new heritage of the enterprising and the strong. We need fear only if we are weak.

"What actually matters now, what during the next few years will have a vital influence on progress during the next decade, is aircraft design. Perhaps we realise it. But certainly I can tell you this, the Germans do."

AIR MINISTRY NOTICES

Donibristle Aerodrome

A 70-foot wireless mast has been erected on the northern side of Donibristle Aerodrome, approximately 200 yards east of the easternmost shed.

(Notice to Airmen No. 60, June 3.)

Aerial Route Traffic Control by Radio-Telephony

1. *Radio-Telephony*.—Radio-telephone stations are open for work at Croydon and Lympne, for the London-Paris and London-Brussels routes. The French authorities have also installed similar stations at St. Inglevert, Valenciennes, Paris (Le Bourget) and the Belgian authorities are arranging to instal one at Brussels (Evere).

2. Stations will shortly be opened for the London, Birmingham, Manchester, Glasgow route at Castle Bromwich, Didsbury and Renfrew.

3. The wireless control of all the British stations, including stations licensed on private aerodromes, will be carried out by Croydon.

4. Wave length, 900 metres.

5. Procedure as in Appendix should be used.

6. Telephony will be used primarily for giving information as to the whereabouts of an aircraft travelling or about to travel along a route; secondly, for reporting weather conditions along the route to the machine.

7. *Routine*.—Hours of watch for British stations are 06.30 to 19.30 G.M.T. (07.30 to 20.30 B.S.T.). The foreign authorities have kindly consented to put their stations in operation if due notification is given.

When aircraft fitted with radio-telephones are scheduled to leave London, notification must be sent to C.A.T.O. Croydon as early as possible on the day of flight, and in any case at least one hour before starting. The C.A.T.O. Croydon is responsible for advising stations along the route of the name (distinguishing signal) of the aircraft and time of departure.

This notification is to be done as follows:—

Taking as an example Handley Page G.E.A.M.A. with telephony scheduled to leave Cricklewood at 09.30 for Paris. As soon as C.A.T.O. Croydon receives notification, he informs Lympne and the French stations as follows: "Handley Page G.E.A.M.A. Cricklewood to Paris 09.30."

Lympne passes this message to St. Inglevert; St. Inglevert passes it to Paris. All stations are thus warned for the flight.

The Aircraft.—Immediately after leaving its aerodrome, calls Croydon, and passes the following message: "Handley Page G.E.A.M.A. clear Cricklewood to Paris."

Croydon replies: "Clear to Lympne."

The aircraft when approaching Lympne and about 20 miles away calls Lympne and passes the following message: "Handley Page G.E.A.M.A. London to Paris."

Lympne replies, if the weather conditions at St. Inglevert according to the last report received from that station are favourable: "Clear to St. Inglevert."

If unfavourable, Lympne replies in accordance with its latest report from the latter station, e.g., "Thick fog in Channel, clear south of St. Inglevert," or "Channel clear, thick St. Inglevert to Abbeville, clear south of Abbeville."

On approaching St. Inglevert, the aircraft reports in the same way and receives a similar reply. Again on approaching Paris the aircraft reports in a similar manner. Paris replies: "Clear to land."

If conditions prevent the aircraft from landing at Le Bourget, Le Bourget replies to this effect, and gives necessary instructions. The French language should be used for foreign stations.

8. All radio-telephonic conversation must be kept as short and concise as possible.

(Notice to Airmen No. 61, June 3.)

Appendix to Notice to Airmen No. 61

Radio-Telephony

Method of Calling Up and Procedure for Two-Way Working.

1. *General*.—All stations normally "listen out" on their assigned wave-length at their routine times.

In the following remarks on procedure, a star (*) indicates change over of the "Receive" "Transmit" switch at a station to the position corresponding to its required function at that moment.

2. *Call Signs*.—(This matter is under discussion at the present.)

3. *Procedure*.—Ground to air and vice versa.

The following illustrates the procedure adopted for work between a ground and an air station where preliminary tuning is probably required:—

Station A has a message for Station B.

A calls up: Hullo B. Hullo B.* A calling. A calling. I have a message for you. I have a message for you. A changing over.

B replies: Hullo A. Hullo A.* Hullo A. B answering. B answering. Please pass your message. Please pass your message. B changing over.

A replies: Hullo B. Hullo B.* Hullo B. A answering. A answering. Message begins. Message begins. To ——. From — (repeats message). Message ends. Message ends. A changing over.

B replies: Hullo A. Hullo A.* Hullo A. B answering. B answering. Your message begins. Your message begins. Message. Your message ends. Your message ends. B changing over.

A replies: Hullo B. Hullo B.* Hullo B. A calling. A calling. That is correct. That is correct. B good-bye. A switching off.

4. *Procedure*.—Ground to ground.* The following abbreviated procedure to be used between ground stations, A and B keeping constant watch and no tuning therefore required.

A calls up: Hullo B. Hullo B.* Hullo B. A calling. A calling. I have a message for you. I have a message for you. Message begins. Message begins. To ——. From — (repeats message). Message ends. Message ends. A changing over.

B replies: Hullo A. Hullo A.* Hullo A. B answering. B answering. Your message begins. Your message begins. Message. Your message ends. Your message ends. B changing over.

A replies: Hullo B. Hullo B.* Hullo B. A answering. A answering. That is correct. That is correct. B good-bye. A switching off.

5. *Repetitions*.—In the event of the repetition of the whole or part of a message being requisite, this will be asked for as required, as also any request to wait on account of interference or other reason.

Motor-Cycle Races in Isle of Man on June 15 and 17, 1920.

On the occasion of the International Motor-Cycle Tourist Trophy Races which take place in the Isle of Man on June 15 and 17, 1920, pilots are particularly requested to avoid flying over the course of the race, unless they do so at an altitude of not less than 6,000 feet. The course of approximately 37½ miles, starting and finishing near Douglas, has to be covered eleven times on the two days by competing machines.

The route follows the road Douglas, Crosby, Ballig Bridge, Kirkmichael, Sulby Bridge, Ramsey, East Snaefell Gate, Graig-ny-Baa, Douglas.

This request is made owing to the grave risk of accident to competitors should their attention be distracted in any way from their riding by aircraft flying low overhead.

(Notice to Airmen No. 62.)

Aerodromes for Civil Use in Egypt and Mesopotamia

It has been decided that where the exigencies of the Service allow, civil aircraft, whether British or foreign, may be allowed to make use of existing facilities at Royal Air Force Stations in Egypt and Mesopotamia.

So far as local conditions permit, the ordinary procedure in regard to the use of Service Aerodromes by civil machines will be followed, with the following exceptions:—

Repairs.—50 per cent. will be added to labour charges to cover overhead charges for all classes of repairs executed. An addition of 10 per cent. will be charged for spares or material supplied.

Fuel and lubricants will be charged for as follows:—

	s.	d.	
Aviation spirit	1	10	} Per gallon exclusive of containers
M.T. spirit	1	6	
Castrol	10	11	
B.B. (heavy)	4	4	
B.B. (medium)	4	0	
Caster oil	8	1	

Accommodation will be charged for at the rate of 4s. per night for officers' quarters, or 2s. 6d. per night if accommodated as non-commissioned officers.

(Notice to Airmen No. 63.)

Royal Navy Wireless Direction-Finding Stations

AIRCRAFT may use the Wireless Direction-Finding Stations operated by the Royal Navy, under the conditions laid down for the use of these stations by the Mercantile



Marine, in Admiralty "Notice to Mariners," No. 524, of March 25, 1920.

The following stations are established in the United Kingdom:—

Station	Call Sign	Lat. N.	Long. W.
Amlwch (a)	B X V	53 24	4 18
Berwick	B V G	55 42	1 54
Carnsore	B V Z	52 12	6 21
Flamborough	B V N	54 07	0 05
Larne	B X J	54 51	5 48
Lizard	B V Y	49 59	5 12
Peterhead	B V L	57 34	1 49
Rhyl (a)	B Z W	53 18	3 29
Seaview (b) (Malin Head)	B X K	55 22	7 19

(a) Rhyl is not fitted with transmitting apparatus and is controlled by Amlwch.

(b) Seaview has no transmitting apparatus, and is controlled by Malin Head (G.M.H.), which keeps watch on 600 metres.

Further information on this subject is contained in Admiralty "Notices to Mariners"—Nos. 363 of February 25, 1920; 524 of March 25, 1920; and 838 of May 22—which should be consulted.

The Admiralty "Notices" may be obtained from the

Admiralty Agent, J. D. Potter, 145, Minories, London, E.C. ("Notice to Airmen No. 64.")

Customs Aerodrome Opened at St. Inglevert

A NEW French Customs Aerodrome was opened at St. Inglevert (8 km. S.S.E. of Calais) on May 20. Customs personnel will be on duty during the day only.

Article 11 (Clause 1) of the "Provisional Agreement relating to Air Navigation between France and Great Britain" should be amended to read:—

"All aircraft entering France must land at, and any aircraft leaving France for England, must depart from, one of the following aerodromes, namely: St. Inglevert or Le Bourget." N.B.—Marquise—Calais is now closed. (Notice to Airmen No. 66.) (Authority: French Notice to Airmen No. 7.)

Customs Examinations of Seaplanes in France

SEAPLANES flying from England to France must alight at one of the following ports for the purposes of Customs examination: Dunkirk, Calais, Boulogne, Le Tréport, Dieppe, Havre, Caen, Cherbourg and St. Malo.

The French Customs Administration enforce the same regulations for a seaplane alighting at a Port as for a ship entering. (Notice to Airmen No. 65.) (Authority: French Notice to Airmen No. 7.)—June 7.

ROYAL AERONAUTICAL SOCIETY NOTICES



Wilbur Wright Lecture.—The Annual Wilbur Wright Lecture will take place at the Central Hall, Westminster, on Tuesday, June 22, at 8.30 p.m., when Commander J. C. Hunsaker, U.S.N. (Corps of Constructors), of the U.S. Navy Bureau of Construction and Repair, will read an important paper on "Naval Architecture in Aeronautics." Friends of Members are invited to attend and tickets for reserved seats will be forwarded on application to the Secretary.

H.R.H. Prince Albert has graciously consented to take the Chair, and has signified his intention of attending a Council Dinner to be held beforehand. It is hoped that Members will assist in securing a representative attendance by forwarding to the Secretary the names of those they wish to be invited.

Lectures (Scottish Branch).—Under the auspices of the Scottish Branch of the Society two well-attended courses of lectures have recently been given to the Students in the Universities in each centre. Colonel W. A. Bristow, Associate Fellow, gave a series of three lectures on "Engines" in

Glasgow and again on three subsequent days at both Edinburgh and Dundee. Squadron Leader H. E. Wimpey, O.B.E., Fellow, gave two lectures on "Navigation and Meteorology" in the Universities, and a "Juvenile" lecture to the senior boys and cadets of the public schools of each centre. Colonel the Master of Sempill will succeed on his return to England, giving three lectures on "Aircraft." A course on "The Technique of Flight" is being arranged.

Election of Chairman.—At the meeting of Council to be held on Tuesday, June 15, the result of the ballot for the election of the Chairman of Council for the year 1920-1921 will be announced. The new Chairman will assume office in October. The following nominations have been received: Air Commodore H. R. M. Brooke-Popham, C.B., C.M.G., D.S.O., A.F.C., Associate Fellow; Mr. Alec Ogilvie, C.B.E., Fellow, and Lieut.-Colonel Mervyn O'Gorman, C.B., Fellow.

W. LOCKWOOD MARSH,
Secretary.

7, Albemarle Street.
June 5, 1920.

THE INSTITUTE OF AERONAUTICAL ENGINEERS NOTICES



Council Meeting.—A meeting of the Council was held on June 1.

Appointment of Vice-President.—Lt.-Col. J. T. C. Moore-Brabazon, M.C., M.P., M.I.A.E. (Hons.), has accepted the Council's invitation to become a Vice-President of the Institute.

Elections.—Honorary Member: Lt.-Col. J. B. Casqueiro, C.M.G.; Member: A. E. Parnacott, M.I.A.E., F.R.S.A.; Associate Members: Major W. T. Blake, T. B. Ringwood, D. A. Jones, A.M.I.A.E., F.R.S.A., W. H. Sheahan, A. T. Cross, A.I.A.E.

Lectures.—The Council would like to receive proposals for lectures by members. A general outline of the proposed lectures should reach the Secretary before August 1 next, but, where possible three copies of the complete lectures should be sent before that date. Out-of-pocket expenses incurred by members delivering lectures are borne by the Institute.

October Examinations.—Members and prospective members are reminded that the latest date for entry for the October Examinations is August 31.

Paris—Athens Three Days a Week

SUCCESS has followed the inauguration of the Paris-Athens aerial express, and the journey is now made three times a week. The time occupied is about 105 hours, owing to delays at Uskub and Belgrade.

A German Balance Sheet

THE Deutsche Luftverkehrs has just published a balance sheet for the period February 20, 1919—February 20, 1920.

Sub-Committees.—The following sub-committees of the Council have been formed: *Accommodation Committee* (to transact preliminaries in connection with selection of permanent headquarters), L. Howard-Flanders, Esq., H. B. Molesworth, Esq., F. G. Moore, Esq., and the Secretary. *Emergency Committee* (to deal with matters of urgency in the absence of Council), L. Howard-Flanders, Esq., H. P. Folland, Esq., H. B. Molesworth, Esq., F. G. Moore, Esq., W. Glass, Esq., and the Secretary.

Donations received for Mrs. Lyne.—Previously acknowledged £15 6s. 6d.; Professor Bryan, £1 1s.; W. O. Manning, Esq., £1 1s.; Frederick R. Simms, Esq., £1 1s.; S. J. V. Pill, Esq., 10s. 6d.; Anonymous, 10s. 6d.; T. C. Letcher, Esq., 10s. 6d.; Group Capt. Longmore, D.S.O., £1; F. S. Wilkins, Esq., 10s. 6d.; R. Rhodes, Esq., £1 1s.; Lord Foley, £2 2s.; J. Sowrey, Esq., 10s. 6d.; Anonymous, £1; Colonel Belaiew, C.B., £1 1s. Total £27 6s. The Subscription List is now closed and cheques have been sent to Mrs. Lyne, who desires to express her deep gratitude to members of the Institute for their timely assistance.

DOUGLAS SHAW,
Secretary.

60, Chancery Lane, London, W.C. 2.

During the year over 3,000 passengers have been carried, and 100,000 kilos. of parcels and goods; 84 machines were used (71 postal aeroplanes and 13 freighters), which flew 650,000 kilometres. The following services were run: From February 5, Berlin—Leipzig—Weimar; from March 1, Berlin—Hamburg; from April 15, Berlin—Hannover—Rheinland—Westphalia and Berlin—Warnemünde; from July 5, Berlin—Swinemünde and Hamburg—Westerland.

Wake up England!

AIRISMS FROM THE FOUR WINDS.

KING GEORGE has again accorded his patronage to the Aero Exhibition opening at Olympia on June 9.

THE Air Ministry is taking an active part in the exhibition, the galleries being mainly devoted to their display. Peace-time flying will be the general note of the items staged, meteorology, wireless telephony and telegraphy receiving considerable attention.

FLIGHT stand at the Olympia Aero Exhibition will be No. 41—immediately to the right of the Addison Road Main Entrance doors.

It looks as if the delay in the arrival on these shores of L.71 is due to the views taken by German workmen and crews of their share in the handing over of this mammoth dirigible. According to the *Lokalanzeiger* attempts are being made at Friedrichshafen to prevent its surrender to us, as well as the

other air craft already ear-marked to the other Allies under the Peace Treaty. It appears that the workmen employed in the Zeppelin construction works, and the crews which were to hand over the airships, have refused co-operation because they consider German airship construction and management threatened by the Entente stipulations. They made their co-operation in the handing over expressly dependent upon the two Zeppelin airships Bodensee and Nordstern being retained by Germany and upon the words "sheds to be destroyed" being omitted.

No doubt a little gentle persuasion will set this right, if in the meantime something does not "happen." At the same time, these obstructive tactics give greater point to the arguments and warnings of Mr. Holt Thomas as to the vital necessity for our own authorities to really get a move on in regard to our future in the air.

APPARENTLY there are some in the United States who, for their own purposes no doubt, are *seeming* to get the wind up over Britain's methods in promoting her aeronautical interests. From what we know ourselves, however, there's not much cause for alarm at present. We would there were. But the latest phase of this stunt about British enterprise takes the form of a scare over our "dumping" our aircraft across the water. Following a statement made in New York, as chief witness before the House Ways and Means Committee which is investigating the Tilson Bill for protection against the "dumping" of foreign aeroplanes into America, a fortnight back, by Brigadier-General Mitchell, Chief of Training and Operations in the American Army Air Service, the House of Representatives has passed and sent on to the Senate a bill designed "To prevent the dumping in the United States of foreign-built aeroplanes." The measure also proposed the establishment of special tariffs on machines manufactured abroad, if sold at less than the present cost of production in the country of origin.

In his evidence Brigadier-General Mitchell declared that if the 10,000 surplus aeroplanes sold by the British Government to a British syndicate were dumped in America that country would have to abandon the idea of developing air power commensurate with that of its European rivals. The admission of these foreign aeroplanes to America, he said, was tantamount to "throwing away the key of our front door—it will mean more, the turning over of this key to a foreign Power." Mr. Mitchell said he would go even farther than the Tilson Bill and shut out all foreign aeroplanes from this country for 10 years.

Mr. Charles F. Redding, representing the Aero Marine and Motor Company, Keyport, New Jersey, informed the Committee that when his company tried to develop the commercial flying boat business in Bermuda they were prohibited by the Bermudan Parliament from establishing terminals there. This prohibition, he said, was inspired in England.

AND so the little comedy goes on. But we wonder what the same folk would say upon the question of the U.S. manufacturers dumping their motor-cars in this country?

EVERYTHING these days seems to have to give way to the "movies." From aeroplanes to cinema is the latest, up Cricklewood way, where it is under consideration to pass over part of the huge Nieuport Aviation Company's works to Sir Oswald Stoll for the purposes of film production; Sir Oswald always thinks in large numbers and if the deal is concluded he will control probably the largest cinema studios in England, after the necessary alterations have been effected. But this gradual absorption for other purposes of the few remaining up-to-date aircraft establishments should give Empire-builders and maintainers (not of the Leicester Square variety) to think strenuously.

AEROPLANES again scored heavily *versus* Time on Derby Day. Utilising them in the most intelligent manner possible, the *Daily Mail* was enabled to score handsomely over all the



OFF TO PARIS: One of the Napier-engined Airco 18 machines recently flew from London to Paris in 1 hour 47 minutes, with seven passengers on board. The machines are designed to carry eight passengers in addition to the pilot. Fitted with a Napier Lion, one of these machines is capable of climbing to 10,000 ft. in 20 minutes with its full complement of passengers. As the cabin is entirely closed in, it is possible to fly in absolute comfort, even at the great speed reached by the Airco 18, and it is therefore only natural that this machine is getting very popular on the Continental Air Express Service



other dailies, with both its Manchester and its Paris editions, by having photographs of the Derby being won, etc., in Thursday morning's papers in each case.

In describing the method adopted in each case, our contemporary states that to enable the pictures to reach Paris (250 miles) in time, they were handed, immediately after the close of the race at Epsom, to a messenger who drove straight with them in a fast motor-car to Croydon Aerodrome, where an Airco machine was waiting. This left for Paris at once with the undeveloped plates, and reached Le Bourget Aerodrome, near Paris, at 6.45 p.m. A fast motor-car was waiting there, and it delivered them at the Paris office of the Continental *Daily Mail* at 7.30 p.m., photographs being posted up in the *Daily Mail* Travel Bureau, 5, Rue Scribe, within 40 minutes of the arrival of the plates at Le Bourget Aerodrome.

WITHIN a few minutes of the finish another batch of plates was on the way to Carmelite House, the London office of the *Daily Mail*, in a specially-fitted London *Evening News* delivery van, which had been converted into a travelling dark-room and printing-room. On the way up to London an operator developed the plates and made contact prints from the negatives. Carmelite House was reached at 4.9 p.m., and within 20 minutes half-tone block reproductions of the photograph necessary for newspaper printing were ready. The blocks were taken by a fast motor-car to Cricklewood Aerodrome, where by special arrangement with Messrs. Handley Page a Bristol Fighter, fitted with Rolls-Royce engine, was waiting with propeller running. Two minutes after the arrival of the car the machine, piloted by Major Foot, with a correspondent of the *Daily Mail* on board, left at 5.12 p.m. in flight for Didsbury Aerodrome, Manchester, 185 miles away. This was reached at 7.30 p.m., or in 2 hours 18 minutes, giving a speed of more than 80 miles an hour. The route was via Birmingham, Stafford, Stoke, Congleton, and Macclesfield, and the height of the machine, which encountered a slight head-wind all the way, varied from 4,000 to 2,000 ft. By 7.45 the blocks were in the Manchester office, whence the Northern, Scottish, and Irish editions of the *Daily Mail* are circulated.

CONGRATULATIONS to Lord Northcliffe and his organisation. Once more has he led the way in aviation progress by showing How.

ANOTHER Derby air item to record is the flight from Paris of four American passengers who, anxious to see the Derby and who had been detained in Paris too late to travel by ordinary means, started by air from Le Bourget at 9.45 on Derby morning, and arrived in good time to be present at the Blue Riband of the Turf. The return journey to Paris

was also to be by air, return tickets having been taken at the start.

STILL a third report of getting home by air is to hand, in this case also due to newspaper enterprise. Three visitors from Glasgow and Leeds, one of them a woman, who were present at the Derby, returned home by air. They motored from the course to Croydon aerodrome, 8 miles away, soon after the race, and flew in an Airco 16 to Leeds and Glasgow. The machine left Croydon at 4.32 p.m., arriving at Leeds at 6.20, and after a 40 minutes' halt proceeded to Glasgow. It carried special photographs of the Derby for publication on Thursday by Leeds and Glasgow newspapers, which had not previously been able to illustrate the race until two days afterwards.

ACCORDING to the Norwegian *National Tidende*, businessmen at Aalesund (north of Bergen, Norway) intend during the coming summer to use seaplanes for seal and whale hunting in Denmark Strait, between Iceland and Greenland. The first of these machines will probably be sent up in the course of this week, and will work in conjunction with the ships, several of which are already in the strait.

By order of General Lord Rawlinson, a grand torchlight tattoo is to be held at Cove Common, Farnborough, on June 16, 17 and 18, commencing at 10 p.m., the proceeds going to the Aldershot military charities. Capt. P. F. Dawson, secretary and manager, is responsible for a most ambitious programme, which includes the massed bands of the Command, fireworks and searchlight displays, a musical ride by the 3rd (K.O.) Hussars, in full-dress uniform of eight periods from 1761 to the present day, displays by the Royal Air Force, and torchlight figures by military units. One of the most thrilling items will be contributed by the Royal Air Force, ten searchlights forming a pyramid in which aeroplanes are to engage in a realistic aerial combat.

A NEW aerial postage stamp has been issued in France, to be attached to letters going by air, in addition to the ordinary postage stamp. It is rectangular and red. The wording is "Republique Française Postes: Correspondance par Avion." The central design is the La Belle France, etc., with, on this issue, a medallion portrait of Guynemer. No doubt other great French flyers will in turn be similarly honoured. The new issue seems to have special attraction for philatelists, who have been so busy in acquiring them, that it has been deemed advisable to stop their sale by post offices, and the only means now of securing one is to send a letter by aerial mail, when the stamp is affixed by the clerk.

WHEN will England have its Aerial Post Stamp?

THE CANADIAN AIR FORCE

SOME little time ago we gave the broad outline of the Air Force which is being organised, and below we give some further details sent out by the Canadian Air Board.

The Government has decided upon the immediate organisation of a Canadian Air Force from among the ex-officers and airmen of the Royal Air Force resident in Canada. The Force will be a militia, not a permanent force. Almost the whole personnel will be non-professional, and the professional personnel will be negligible in number.

The total authorised strength will probably be in the neighbourhood of 5,000. Commissions will be given to officers, and airmen will be enlisted in the usual way. It is proposed that training should be carried on at training centres which the personnel will attend, not by units, but as individuals, the training centres remaining in operation throughout the year, and individuals attending as may be arranged or directed during one month in every twenty-four, being on leave without pay at all other times. They will receive pay while on duty, and their travelling expenses to and from the training centres will be paid.

It is considered important that the training should not only provide efficient junior officers and airmen, but that it should be such as to furnish a supply of senior officers qualified to take command of larger formations in emergencies, and an opportunity will consequently be afforded to senior officers to take command of training centres for periods longer than one month, but probably not in any case exceeding six months.

The undertaking of duty for such extended periods will not be compulsory. It is hoped that the same plan may be applied to the duties to be performed at Canadian Air Force Headquarters, and that a succession of officers will be found from time to time able to assume duties at Ottawa in connection with the administration of the Force as a whole.

The training stations will be few in number. At first it may not be possible to establish more than one, but at least a second will doubtless have shortly to be added, and plans for this purpose are under consideration.

The local administration of the Force will be carried on by provincial executive committees acting without remuneration, but receiving a grant towards the expenses of maintaining an office and the payment of a secretary. Four members of the committee shall, after the first year, be elected by the officers on the active list of the Force in the province, the remaining three being nominated by the lieutenant-governor of the province, who will act as honorary president of the branch in his province.

It is proposed that the active list should include only officers of such an age that they can be expected to render useful air service in war, and retirement from the active list will be compulsory for junior officers at or about the age of 30, and for the most senior officers at or about the age of 38.

Further details can be obtained by those interested from the Secretary, Air Board, Ottawa.

AIR LEAGUE OF THE BRITISH EMPIRE

At the inaugural meeting of the A.L.B.E. at the Mansion House on Tuesday there was a gathering of influential prominent men, including the Lord Mayor, who presided.

Amongst those supporting the Chair were Maj.-Gen. Seely, M.P., Lord Hugh Cecil, M.P., Mr. Stanley Machin (President, London Chamber of Commerce), Sir William Joynson-Hicks, M.P., Col. Alan Burgoyne, M.P., Maj.-Gen. Sir J. E. Capper, Lord Montagu of Beaulieu, Earl Russell, Col. and Alderman Sir Charles Wakefield, Lord Strachie, Lord Leigh, Sir John Shelley-Rolls, Maj.-Gen. Sir Richard Ruck, Brig.-Gen. Bagnall-Wild, Brig.-Gen. Maxwell, Sir William Dunn, Sir Banister Fletcher, Brig.-Gen. W. E. Caddell, Mr. R. M. Balston, Mr. Shirreff Hilton, Mr. Bartley Dennis, M.P., Sir Charles Bright, Mr. J. Fortescue Flannery, M.P., Mr. Ivor Philipps, M.P., Mr. Henry S. Cautley, K.C., M.P., Sir Alfred Temple, Col. J. T. C. Moore-Brabazon, M.P., Col. Burn, M.P., Mr. T. R. Hughes, K.C., Mr. Holt Thomas, Major Hechstall Smith, Col. Uvan B. Davson, Col. E. A. Ewart, Mr. Mallaby-Deeley, M.P., Mr. Sidney Boulton (Chairman of Lloyd's), Mr. A. H. Campbell (deputy-chairman of the Stock Exchange), Mr. Charles Howard (Chairman of the Baltic), Hon. Reginald Parker, Brig.-Gen. Sir Capel Holden, Sir Joseph Petarel, etc.

The meeting, which was called by the League with the object of emphasising the urgent need of a strong policy to forward the interests of commercial aviation and the dependence of the safety of the Empire on an air fleet consisting of commercial machines, gave unanimous approval to a resolution approving of these aims, and pledging itself to maintain our leadership in the air, both civil and military.

The Secretary, Mr. Douglas G. H. Gordon, read a letter from Viscount Burnham, regretting his inability to be present at a meeting for the formation of an Air League, "which will mean a great deal for the extension and popularity of the Air Service and for air transport generally." It seemed to him, the writer continued, that we were fast unlearning the lessons of the War, and in nothing more than in their application to aeronautics. If immediate justification on a financial and commercial basis was to decide the part that Great Britain was to take in the development of flying, he feared our interests might suffer from a dangerous eclipse, if not a total collapse. It was unreasonable to expect that, without encouragement and assistance from His Majesty's Government, civil aviation could at once be established on a paying basis. It was not reasonable or possible in the case of what was not only an infant industry, but a new order of enterprise, yet they had had shown them on a big scale what aviation meant in speeding up communications for the civil power and prestige of the Empire, not less than its essential importance in war, and what they used to call warlike operations in the distant parts of the world. The newspaper press was of one mind in forwarding the progress of aviation, but that was not enough. They wanted to concentrate not only the goodwill, but the practical energies of all the powers that counted on the same end, which was to secure for Great Britain the same predominance in the air which she had long held on the sea. He believed the Air League would do much to help on that great effort.

The Lord Mayor said the City had always taken the lead in times of national defence. He trusted that that meeting would inaugurate an Imperial movement for the Air Force on the widest scale possible, and that it would not be found wanting in the time of need. We were no longer an island depending on the Navy for our defence, but now had to defend ourselves against aircraft of all sorts. Great Britain must try to take the lead and come out on top. Lloyd's had done all it could by cheap rates to facilitate the development of the commercial side of aviation.

Gen. Seely, the President of the League, said that the City of London had always been foremost in any matter affecting the safety, honour and welfare of His Majesty's dominions, and it was because so many of them felt and knew that that safety, honour and welfare, if not in jeopardy, were at least in hazard, that they were there.

However necessary economy might be, they as plain, common-sense men, were determined that the potential advantages which might flow from our supremacy in the air should not be overlooked, and that the potential dangers which might follow from its loss must be resolutely faced and overcome.

In 1918 we were incomparably the best-equipped of all nations in the air. The Government had very wisely been the first to establish a separate air service, with a separate Minister giving his whole time to that most vital of national

problems. "Today the position was indeed serious. If it were a little more serious, they could not talk about it. It could be retrieved, but immediate action was necessary. The State had practically gone out of business. Its own directly controlled establishments were confined to the scientific side, apart from any power to make adequate tests in the air. Without practical demonstration scientific research was of little value. Of 10 great firms with their designing staffs, many had gone out of business altogether, and within a year or two there was the danger of this great potential brain power being dispersed either to other work or to other countries. The recent discovery of a new type of aeroplane wing, which might have far-reaching results, was a proof of what could be done by a good designing staff.

The wise action of the Government in forming a separate Air Ministry had to a large extent been neutralised by the extraordinary expedient of placing the Air Service under the paralysing influence of old-fashioned militarism. They could not have progress in a great science like that of aviation when it had to be under such an utterly inappropriate body. That was the position here, but abroad things were different. In France the Government was taking active steps to see that the designing staffs should not disappear, and to this end were subsidising certain air routes. In Germany, from information he had obtained, there were millions of men who were firmly determined to win back by the air what they lost by sea and land, and there were eighteen large companies and firms, with most powerful financial backing, who were devoting themselves to scientific progress and preparation for rapid and immediate development of aviation. That information might be denied for interested reasons, but he knew it to be true. He was not there to create a panic—it was not necessary—but they had to face facts, and that was a fact which he did not think would be disputed.

The league urged the Government to disavow this arm from the paralysing and strangling hold of old-fashioned military minds.

"I say here and now, and I challenge contradiction," continued Maj.-Gen. Seely, "that the Navy is not now getting the air equipment and assistance that it needs to make the Fleet efficient. I challenge contradiction of this, but if it be true it is a serious matter. A fleet without air power is blind. So long as we remain an island, so long shall we rely on sea power. Whatever the power of the air may be, in the long-run sea power will be our most vital need, and sea power is going to be profoundly modified from day to day by the air power working with it." They asked the Government to take the necessary steps to prevent the dispersal of the designing staffs. There was no co-ordination between the Army, the Navy and the Air Service, and they urged the Prime Minister, to whom for his services in the War they owed a debt they could never repay, to call around him those who understood the importance of the air, the land, and the sea services, and to set up the Committee of Imperial Defence for the purpose of studying those questions and treating them as one. Our national defences were suffering from "floppy control," and we must be restored to our position of supremacy in the air.

Lord Hugh Cecil, moving a resolution in support of the objects of the Air League, said that it was desirable to encourage a return to economy by the State and enterprise by the individual. Aviation, which was in a state of very early development at the beginning of the War, was forced forward by it, and had now been left without the slightest support from the State. It was in the position of an inebriate who suddenly found himself in a country that had gone bone dry. They believed that even now, in the very restricted financial position of the country, something must be spent in order to prevent throwing away everything that had been acquired hitherto. They wanted to see clearly what was the martial problem for the Air Service, and also to see clearly what was the relation between the martial Air Service and the work of civil aviation. The essential thing was to preserve this country from an aggressive attack from abroad. It was indispensable to the life of the country that we should not be exposed to attack from the air. It was a thing over which we could not afford to be parsimonious, even in the greatest financial stress. The first and urgent martial problem was direct defence of the island in the air. We must have a fund of pilots, aerial plant, and designing staff. What the Government ought to do was to give what assistance it could, like subsidising the carrying of mails to civil transport conducted by private enterprise, to develop aerial research by direct assistance and experiment, and retain a designing staff of its own for that purpose; and to encourage aeronautics in those large parts of the Empire where its civilian



utility would be much more rapidly made commercially justifiable than was likely in this country itself. There was far greater scope for commercial aviation in countries where competition by the railways was not so highly developed as here.

Nothing could be more mischievous than to think of the Air Service as ancillary to the Army. We wanted an independent Air Force led by an independent Minister, and that Minister could co-ordinate civilian activities with the naval and military departments. Mr. Churchill would make a very good Air Minister, but he would like to see him cease to be War Minister. We should make no progress in the intelligent handling of the problems of aviation until we had a distinct, independent Ministry.

HONOURS

It was announced in the *London Gazette* dated June 1, that the King has given orders for the following appointments to the Most Excellent Order of the British Empire (Civil Division) in connection with the War (to be dated January 1, 1920).

Officer (O.B.E.).

CHARLES ERIK CAPITO, Esq., Field's Manager, Anglo-Persian Oil Co., Ltd.

Members (M.B.E.).

HERBERT THOMAS AVERAY-JONES, Esq., Manager, Asiatic Petroleum Co., Rouen.

Mrs. NINA MABEL MARY ST. MAUR, Aircraft Production Department, Ministry of Munitions.

It was announced in a Supplement to the *London Gazette*, dated June 5, that the King has been graciously pleased, on the occasion of His Majesty's birthday, to signify his in-

tention of conferring a Baronetcy of the United Kingdom on the following:—

SIR HOWARD GEORGE FRANK, K.C.B., Director-General of Lands, War Office, Air Ministry, and Ministry of Munitions, Chairman of Disposals Board.

It was also announced that the King has been graciously pleased, on the occasion of His Majesty's birthday, to give orders for the following promotions, in, and appointments to the Most Honourable Order of the Bath:—

K.C.B. (Military Division)

Rear-Admiral CECIL FOLEY LAMBERT, Director of Personnel, Air Ministry, and a member of the Air Council.

Air Vice-Marshal EDWARD LEONARD ELLINGTON, C.B., C.M.G., C.B.E., R.A.F., Director-General of Supply and Research, Air Ministry, and a member of the Air Council.

ROME-TOKYO FLIGHT

LAST week we recorded the completion of this 10,000 miles flight by two of the competitors. Originally the preparations of the Italian aviation authorities for this adventure were of a most elaborate character, and it was hoped to rival, in the result, the great Australian journey. As it now transpires, the cost has been altogether out of proportion to the results and effects achieved. It has been put at as high a figure as £480,000! As an object lesson in commercial air work, the flight can hardly be regarded favourably, but at the same time the difficulties which arose and had to be surmounted by the various competitors were phenomenally trying.

At different times at least 11 machines actually started from Rome in the competition. It was the flight in which D'Annunzio hoped to take part but abandoned owing to his pre-occupation with political and "dictatorship" affairs at Fiume, and the "race" ultimately resolved itself into a friendly contest between the two airmen who have reached Tokyo, both of whom left Rome on the same day, February 14. Masiero was three days behind at Baghdad, but overtook Ferrarin before Karachi. At Calcutta they were level and left together, but Masiero again forged ahead and reached Canton first. China, however, brought disaster, and Masiero's machine was so badly damaged that he had to requisition another machine, and was thus disqualified.

Ferrarin was therefore the first to reach Peking, where the Chinese Aviation Department presented him with a silver incense burner as the first man who had flown across the continent of Asia.

The competition has not been without its accidents and adventures. At Bushire two airmen were killed in a crash; at Calcutta another plane was smashed to pieces, the airman having a marvellous escape; whilst a third machine was shot down by Arabs with machine guns near Aleppo.

The following table shows the stages of Lieut. Ferrarin's flight:—

February 14.—Lieut. Ferrarin leaves Rome with Masiero.
February 21.—Ferrarin leaves Adalia.
February 22.—Arrives at Baghdad.
February 29.—At Bander Abbas, Persia.
March 12.—Arrives with Masiero at Calcutta.
March 24.—Departure from Calcutta.
April 14.—Departure from Rangoon.
April 22.—Arrival at Canton.
May 2.—Departure for Foochow.
May 17.—Arrival at Peking.
May 23.—Departure from Peking.
May 25.—Arrival at Seoul (Korea).
May 30.—Arrival at Osaka.
May 31.—Arrival at Tokyo.

IN MEMORIAM

A SERVICE was held at noon, June 7, at the Church of St. Martin-in-the-Fields, Trafalgar Square, in memory of Air-Commodore ROBERT MARSLAND GROVES, C.B., D.S.O., A.F.C., and Flying Officer CLARENCE OSCAR BIRD, who lost their lives last month in an aeroplane accident at Heliopolis, Egypt. The officiating clergy were the Rev. H. D. L. Viener, Chaplain-

in-Chief to the R.A.F., and the Rev. R. E. Vernon Hanson, R.A.F., and among the congregation were the mother, Mrs. James Groves, and the son of Air-Commodore Groves, and the late officer's brothers and sisters, and the widow, mother, and brother of Flying Officer Bird.

Fires at Cranwell Aerodrome

ON Tuesday of last week a fire occurred at Cranwell Station near Sleaford, when the old warrant officers' mess-room was burnt out at a loss of about £1,000.

Following this, on Friday evening, a large aeroplane shed was burnt to the ground, and from 130 to 150 Bristol and late-type De Havillands are reported destroyed.

The cause of the fire is unknown, and all efforts of the camp fire brigade to check it failed. The roof of the shed fell in, large girders were bent and twisted, and the windows melted by the great heat. The damage to the building is estimated at about £10,000, and it is stated that the total loss will be nearly £250,000. The shed belonged to B Flight, and the site is close to Cranwell Station.

These fires may be coincidences only, but we are glad to learn that a Court of Enquiry is to be held into the occurrences.

A Helicopter Flight

It has been stated that M. Douheret succeeded in making two flights on his "heliceplane," one, horizontally, of about 80 metres, and the other, vertically, to 50 centimetres.

An R.H.S. Award

FOR jumping into the Thames at Hampton Court Bridge and saving a Surbiton boy, Capt. Usher, R.A.F., of East Molesey, has been awarded the Royal Humane Society's Certificate on vellum.

THE ROYAL AIR FORCE

London Gazette, June 1

Permanent Commissions

Sqdrn. Leader D. E. Stodart, D.S.O., A.F.C., is granted a permanent commn. as Sqdrn. Leader (A.); May 21.

The following are granted permanent commns. (Chaplains' Branch):—Rev. H. Beauchamp, M.C., Rev. D. F. Blackburn, Rev. J. Firth, M.C., Rev. A. McHardy, M.A., M.C.; Aug. 1, 1919.

The notification in *Gazette* of Aug. 1, 1919, appointing the following officers to permanent commns. is cancelled:—Capt. C. M. Crowe, M.C., D.F.C. (A.); Lieut. H. W. Pearson (A.).

Short Service Commissions

The following are granted short service commns. (Chaplains' Branch):—Rev. M. J. Dunne, M.C., Rev. D. H. Gillan, M.A., B.D., Rev. S. J. Jones, M.C., Rev. R. Hall, O.B.E., Rev. J. S. Hobson, Rev. W. Moffat, M.A., B.D.; April 1.

The notification in *Gazette* of Jan. 30 appointing Flight-Lieut. F. J. W. Hedgcock (T.) to a short Service Commn. is cancelled (substituted for notification in *Gazette* of May 18).

Flying Branch

Sqdrn. Leader M. G. B. Copeman is restored to active list from h.p. list; May 31.

Lieut. W. Ledlie is graded for purposes of pay and allowances as Capt. whilst employed as Capt. (A.) (from May 1, 1919, to May 18, 1919).

Pilot Officers to be Flying Officers:—J. M. Butow, Feb. 3; J. H. McBride; March 19.

The following relinquish their temp. R.A.F. commns. on return to Army duty:—Pilot Officer (Hon. Flying Officer) G. W. L. Day (Lieut., R.E.); May 9, 1919. Flying Officer E. Goodman-Jones (Lieut. Sask. R.); May 28.

(Then follow the names of 18 officers who are transfd. to the Unemployed List under various dates.)

The following Sec. Lieuts. relinquish their R.A.F. commns.:—W. McL. Hiron; April 3, 1919. N. E. Mustoe; April 18, 1919 (substituted for notification in the *Gazette* of May 9, 1919). A. McCullough; Dec. 18, 1919.

The notification in the *Gazette* of July 8, 1919, concerning Sec. Lieut. W. McL. Hiron is cancelled.

The notification in the *Gazette* of Jan. 6, concerning Sec. Lieut. A. McCullough, is cancelled.

The notification in the *Gazette* of June 11, 1918, on page 6,936, concerning P.F.O. C. C. Woods, is cancelled.

Administrative Branch

Lieut. R. H. Rook, M.C., is graded for purposes of pay and allowances as Capt. while employed as Capt.; May 1, 1919. (Substituted for notification in the *Gazette* of Sept. 16, 1919.)

Sec. Lieut. J. H. E. Weekes is graded for purposes of pay and allowances as Lieut. while employed as Lieut. from May 1, 1919, to April 21.

(Then follow the names of 6 officers who are transfd. to the Unemployed List under various dates.)

The notification in the *Gazette* of Aug. 5, 1919, concerning Sec. Lieut. W. M. Sinclair is cancelled (notification in the *Gazette* of April 20 to stand).

Technical Branch

Maj. R. D. Carey, O.B.E., to be Maj., Grade (A.) from (Ad.), from May 1, 1919, to Oct. 13, 1919.

Pilot Officer J. J. Somerville to be Flying Officer, Grade (A.); March 2.

Pilot Officers to be Flying Officers:—W. Badley, T. H. Moon, J. W. Rose, C. Snow; Oct. 1, 1919.

Sec. Lieut. J. R. Gardiner to be Lieut. without pay and allowances of that rank; July 2, 1919.

Sec. Lieut. T. A. Roberts to be Lieut. without pay and allowances of that rank; Oct. 8, 1918. (Substituted for notification in *Gazette*, Jan. 3, 1919.)

Pilot Officers to be Flying Officers without pay and allowances of that rank:—E. R. Wood; Aug. 1, 1919. H. Parker; Aug. 3, 1919. R. Q. Bamber; Aug. 5, 1919.

T. A. Roberts (Sec. Lieut. Lancs. Fus., T.F.) is granted a temp. commn. as Sec. Lieut. Grade (A.); Oct. 7, 1918.

Sqdrn. Leader H. E. Day, D.S.O., M.V.O., relinquishes his temp. R.A.F. commn. on return to Army duty; June 1.

Lieut.-Col. A. C. Bishop (Capt., temp. Lieut.-Col., Berks Yeo.) relinquishes his R.A.F. commn. on ceasing to be employed, and is permitted to retain the rank of Lieut.-Col.; Jan. 31, 1919.

(Then follow the names of 6 officers who are transfd. to the Unemployment List under various dates.)

The notification in *Gazette* Feb. 11, 1919, concerning Lieut.-Col. A. C. Bishop is cancelled.

The notification in *Gazette*, Oct. 29, 1918, concerning Lieut. T. A. Roberts, is cancelled.

Memoranda

(Then follow the names of 2 Overseas Cadets granted temp. commns., and 32 Cadets granted hon. commns. as Sec. Lieuts.)

The following Prob. Flight Officers are granted hon. commns. as Sec. Lieuts.:—S. Stevens; Jan. 13, 1919. A. C. Norcross; Jan. 16, 1919. C. B. Symington; Feb. 10, 1919. L. W. Smith; Feb. 26, 1919. N. V. W. Lucas; March 7, 1919. E. C. Phillips; March 23, 1919. F. T. B. Snow; April 4, 1919. A. L. Parnell; April 7, 1919. B. L. Pelham; Sept. 17, 1919. T. O. M. Pope; Oct. 12, 1919.

Sec. Lieut. G. C. Oliver relinquishes his commn. on account of ill-health contracted on active service, and is permitted to retain his rank; May 29.

London Gazette, June 4

Permanent Commissions

Sqdrn. Leader His Royal Highness, Prince Albert, K.G., Personal A.D.C. to the King, is promoted to the rank of Wing Comdr; June 1.

Flying Officer A. E. Gooch (T.) resigns his commn. on account of physical unfitness for flying; June 5.

Short Service Commissions

Flight Lieut. C. A. Taylor (A.) relinquishes his commn. on account of physical disability, and is permitted to retain his rank; June 5.

Flying Branch

Flying Officer A. Dix-Lewis (Lieut. Middx. R.) relinquishes his temp. R.A.F. commn. on ceasing to be employed; May 17.

(Then follow the names of 14 officers who are transfd. to the Unemployed List under various dates.)

Administrative Branch

Pilot Officer S. A. Knight to be Flying Officer; May 5.

(Then follow the names of 8 officers who are transfd. to the Unemployed List under various dates.)

Lieut. W. H. D. Phillips is placed on retired list, and is granted rank of Capt.; Feb. 11. (Substituted for notification in *Gazette* of Feb. 10.)

The notification in *Gazette* of Jan. 28, 1919, concerning Sec. Lieut. C. D. Parker is cancelled.

Technical Branch

Flight Lieut. (Hon. Sqdrn. Leader), A. Crook to be acting Sqdrn. Leader while employed as Sqdrn. Leader, Grade (A.); Aug. 1, 1919.

(Then follow the names of 11 officers who are transfd. to the Unemployed List under various dates.)

Sec. Lieut. C. F. Kempton relinquishes his commn. on account of ill-health contracted on active service, and is permitted to retain his rank; May 28.

Sec. Lieut. E. Hiscock (Sec. Lieut., Gen. List) relinquishes his temp. R.A.F. commn. on retirement from the Army, and is granted rank of Lieut.; June 5.

Medical Branch

Flying Officer J. Kyle to be Flight Lieut.; April 2.

One officer transferred to unemployed list.

Dental Branch

J. H. W. Fitzgerald is granted temp. commn. as Flight Lieut.; June 1.

Memoranda

Group Capt. E. L. Gerrard, C.M.G., D.S.O., is restored to Active List from h.p. list; June 2.

(Then follow the names of 13 Cadets granted hon. commns. as Sec. Lieuts.).

Maj. (acting Lieut.-Col.) S. S. Kennedy, O.B.E., relinquishes his commn.; March 15, 1919. (Substituted for notification in *Gazette* of April 1, 1919.)

AVIATION IN PARLIAMENT

Military Forces (Tanks and Aeroplanes).

MR. LUNN, on June 3, asked the Secretary of State for War and Air what is the number of tanks and aeroplanes, respectively, employed at present in Ireland.

Mr. Churchill: There are in Ireland 40 tanks and 28 aeroplanes.

Aerodromes, South Coast

SIR J. DAVIDSON, on June 3, asked the Secretary of State for War and Air what aerodromes it is the intention of the Government to maintain on the south coast in the neighbourhood of Portsmouth and Southampton?

Mr. Churchill: It is intended to maintain an aerodrome at Gosport, and two seaplane stations, one at Calshot and one at Lee-on-Solent.

Aeronautical Instruction

MR. HOPKINS asked the Secretary of State for War and Air whether it is a fact that at the commencement of the present educational session, October 1, 1919, no course in aeronautics was available for students, either at the Imperial College, or at Cambridge, nor is available at the present time; and whether it is the intention of the Government, in view of the inadequacy of the provision for instruction, to render financial assistance for the teaching of aeronautics at Cambridge and the East London College, or whether it is intended to exclusively confine Government assistance to the work at the Imperial College?

Mr. Churchill: With regard to the first part of the question, there is a Chair of Aeronautical Engineering at Cambridge, and undergraduates reading for an engineering degree can study the aeronautical side of this subject. The course at the Imperial College is a post-graduate one, and though lectures have begun, the scheme will not be in full operation until the commencement of the academic year, next October. With regard to the second part, I would refer my hon. friend to the Government decisions quoted in the Report, dated December 12 last, to which I drew his attention in my reply to his question on 17th of last month. One clause of this report states that applications for assistance in these matters from any university will be considered.

Entertainments Duty (Aero Exhibition)

MR. BILLING on June 7 asked the Chancellor of the Exchequer whether, having regard to the necessity for encouraging the development of civil aeronautics in this country, he is prepared to consider favourably an application for exemption from Entertainments Duty in respect of the forthcoming Aero Exhibition?

Mr. Chamberlain: I am advised that the forthcoming Aero Exhibition is not entitled to exemption from Entertainment Duty under the provisions of the law.

Aeroplane Hangars, Southampton

MR. PALMER on June 7 asked the Parliamentary Secretary to the Ministry of Munitions whether he is aware that, during the last few weeks, three hangars on a common known as West Marlands, Southampton West, measuring each about 50 yards by 40 yards, which were erected less than two years ago, have been left without a caretaker, with the result that destruction has been caused by the tearing and ripping away of the canvas which is used by children to make swings within the hangars; that in one hangar dozens of wings of aeroplanes have been broken and thrown about; that men visit the place with barrows and tear linen from the wings which they stuff into sacks; that an immense quantity of iron and steel bolts has been stolen; and that every available piece of wood has been torn down and removed; and if he will state the cost to the State of these hangars, erected as a temporary collecting house for aeroplanes brought over from France, and who is responsible for this failure to protect public property and the consequent waste of public money?

Mr. Hope: The hangars in question were notified to the Disposal Board by the Air Ministry as surplus early this year, and were sold on May 4. The size of the hangars is 66 feet by 79 feet. The responsibility for custody, previous to the date of sale, rested with the Air Ministry, and since that date rests with the purchasers. I have no knowledge of the original cost to the State of the hangars in question.

Mr. Palmer: Can the hon. gentleman say what price was paid for them and who bought them?

Mr. Hope: I must have notice of that question.



NOTE.—All communications should be addressed to the Model Editor

Some General Notes

THERE are three salient points to be borne in mind on which the durability of a model aeroplane largely depends: (1) its capacity for resisting the torque of the rubber motor; (2) of absorbing the shocks of rough landing, and (3) the provision that has been made for the rigid attachment of the various parts. If the machine is at fault with regard to point one, fuselage distortion is likely to occur, and resulting from this there will be lack of alignment of the surfaces and attendant troubles. Point two calls for suitable bracing of the spar or spars, and careful choice of timber. It is inadvisable to use wood of square cross-section, an oblong section with the greatest measurement placed vertically being preferable. If no arrangement has been made rigidly to fix the wings, chassis, etc. (point 3), these parts are likely to rock or sway when the machine is in the air, and so occasion bad stability, apart from which a couple of landings would shake the machine out of truth.

For single-stick models the mainspar should be tapered fore and aft from a point one-third of the length from the front of the machine. Where it is necessary to pierce the spar of a model aeroplane for the reception of a kingpost or other member, silk tape binding should be used, the point being soaked with clean, weak glue.

Drawings.—I would admonish those designing their own models first to make a scale drawing as large as possible in pencil, amending it until the construction is practicable and satisfactory; and then take a tracing from it in Chinese or Indian ink. If ferro-prussiate paper can be procured, a blue print of the drawing may be taken by using the tracing as a negative, covering the ferrotype paper with it, and in turn covering them with a sheet of glass so that tracing and blue-print paper are flat against one another. The latter point is an important one because no light must percolate beneath the lines on the tracing (known as the image).

Some standard size should be adopted with the drawings, say half size, full size or double size, to facilitate their being kept in volume form, and the specification included thereon, giving the loading, estimated speed and all cardinal points necessary for reference. It will be found useful to make one sheet giving plan, side and front, dimensioned elevations of each model built, and a second, showing constructional details, not discernible from the former, of course to an enlarged scale.

Records Necessary.—It is also necessary and consistent that a record of the actual performances of each model be kept, so that comparison between desired and actual results can be made. For reference purposes some system of tabulation of each machine should be made, and its drawing lettered to correspond. Any rectifications or alterations made in construction should be drawn, and a record kept of them. This is the only way to gain experience and make your work of value. Furthermore, it is the only way to make achievements. If any particular design of propeller is found to give better results than the other, or to give results which are not favourable, the reasons for this should be sought and a note made of them.

In the course of a twelvemonth such notes make highly interesting reference matter. Alas! how many aero clubs there are who work most assiduously, accomplish much useful work, but owing to lack of systematic record are unable to actually show what they have done. How many also have, from very unambitious beginnings, aspired to gliding and even to full-size practice.

Origination of the Elastic Motor.—The elastic skein as a motive power for model aeroplanes was discovered by Penaud about the year 1870. Since then it has been used extensively for aeronautical experiments. At present there are only five forms of power applicable to model aeroplanes, viz., super-heated steam, petrol, CO₂ (carbon dioxide), and compressed air. It is interesting to note that one of the most successful power-driven models (as distinct from elastic) was driven by a super-heated steam plant designed by Mr. H. H. Groves. Carbon dioxide and petrol are but a qualified success. Compressed air has been used with great success, and the writer of this section has evolved a plant

which has given very satisfactory results. It will be described herein in due course.

Judging the Weight of Rubber.—Many may wonder how to determine the number of strands of rubber required to fly a given model. In the first place no definite rule applies, and it is much better to underpower to machine for test flights, and gradually work up to the correct amount rather than to overpower the machine.

The exact quantity of rubber required cannot be given in number of strands on account of the great variations met with in the cross-sectional size. In fact, I have for some years given up considering the strands separately, and always put on rubber now by weight; by this means a much better lateral balance can be got on light delicate machines as well as greater certainty of balancing the propeller thrust.

Finding Pitch of Propeller given size of material available.—The following method of calculating the pitch of any propeller that can be made from a given block of wood will be found useful. The formulae is $\times D \times \text{thickness of block one-third width of block inverted}$. For example we have a rectangular block of wood $12 \times \frac{3}{4} \times 1\frac{1}{2}$ in., therefore the pitch of the propeller which can be cut from that block will be

$$\frac{22}{7} \times \frac{12}{1} \times \frac{3}{4} \times \frac{2}{3} = \frac{132}{7} = 18\frac{6}{7} \text{ in.} = \text{pitch.}$$

When building heavy models it becomes necessary to gear two skeins of rubber together in order, firstly, to obtain the required duration and secondly, to reduce the torque or torsion of the elastic skein upon the spar.

Proportions of Air-screw.—It is usual to make the diameter of a propeller equal to one-third the span, and the pitch one and a half times the diameter. For twin-screw models no hard and fast rule exists with regard to diameter; for, since the torques of the oppositely revolving screws will counteract one another, they can be made of rather large diameter and fairly long pitch, although it is not advisable to make the pitch longer than the circumferential measurement of the disc swept by the propeller; that is to say, the pitch angle should not exceed 45 deg.

The width of a propeller blade should be from $\frac{1}{4}$ to $1\frac{1}{2}$ of the diameter. The pitch for single screw machines should never exceed three times the diameter, when the pitch angle will be nearly 45 deg. The pitch angle for twin screws should not exceed 60 deg. Beyond these limits the screw begins to lose efficiency.

Carved propellers are much more efficient than bentwood ones, albeit a little heavier. Nevertheless for racing and duration models, quite satisfactory results are obtained from carefully made bentwood screws. It is interesting to note that Mr. L. H. Slatter, holder of the world's record for duration, viz., 2 mins., 49 secs., used bentwood propellers.

Centre of Pressure, etc.—Another rule which is vitally important to the success of the machine is that the centre of pressure must be coincident with the centre of gravity. The centre of gravity is easily located by balancing the model on a knife edge, but the centre of pressure is more difficult to determine. It is generally situated at a point one-third the chord from the leading edge, hence the wing should be temporarily fixed with this point directly over the centre of gravity. The maximum camber or curvature of the ribs should also be placed as nearly as possible on the c.p. the greatest depth of camber being made from one-twelfth to one-sixteenth of the chord. For very deep cambers double ribbing and double surfacing are essential, the bottom camber being made about one-half that of the top.

Lift and Speed.—The speed of an aeroplane varies as the angle and the square of velocity. That is to say, double the angle of incidence of the surfaces, and you double the lift. Half the angle and the lift is one-half of its original amount. Double the velocity and the lift is doubled; half the velocity and the lift is reduced to one-fourth.

The first successful power-driven aeroplane was designed and built by an Englishman named John Stringfellow, who constructed a steam-driven machine. He was the well-known collaborator of James Henson.

(To be continued.)

SIDEWINDS

MESSRS. BARIMAR, Ltd., point out, *apropos* of the very thorough inspection of all car and motor transport vehicles, both by the Metropolitan and the Provincial police, how strictly the authorities insist upon the observance of correct construction and sizes, even of such parts as number-plates. It cannot too strongly be borne in mind by all motorists that the police regulations provide, not merely for the exact sizes of number-plates, but for the shapes of such plates, and even the breadth and spacing of letters and figures. Minimum margins are assigned for the spaces between the registration numbers, and the tops, bottoms and sides of plates, and there are special regulations for motor-cycle plates. Just now, the police are closely scrutinising identification plates, and even measuring such plates. There is still a good deal of uncertainty in regard to the regulations, as is evidenced by the fact that many customers still ask for Barimar cast aluminium number-plates of special sizes and shapes that are not permissible. Users will do well to see that plates are kept clean and the numbers distinct.

WE hear from Mr. W. L. Hamilton, of the Fairchild Aerial Camera Corporation, of 17, West 42nd Street, New York City, that they have been fortunate enough to secure the co-operation of Dr. Herbert E. Ives, lately Major in charge of the Experimental Department, Photographic Branch, U.S. Air Service (author of "Airplane Photography").

DR. IVES has had extensive experience in scientific research, in the Bureau of Standards and other prominent laboratories. He is well-known for his contributions to optical and photographic science, and his experience along these lines will be of particular value in insuring the scientific excellence of the apparatus put out by the Fairchild Aerial Camera Corporation.

In addition to his pre-War experience, Dr. Ives had unique opportunities during his army service to learn at first hand of the problems and methods employed in aerial photography on the American, English, French and Italian fronts. The results of Dr. Ives' study of the subject are set forth in his recent book "Airplane Photography," just issued this side by Messrs. the J. B. Lippincott Co.

THE functioning of an engine, however perfect, is neutralised if the ignition system be faulty. It is interesting, therefore, to note that the two Napier "Lion" engines which were used on the Handley-Page machine that secured the official record for the highest flight of a machine with a useful load carried, height 13,999 ft., load 3,690 lbs., were equipped with B.T.H. magnetos, again proving, if any proof were required, the reliability of these magnetos in actual service.

AN interesting development is announced by the Northern Engineers Supply Co., of John Street, Sheffield, who have opened a department for the supply of spare parts, special tools and accessories for Aero work, of which they have a comprehensive stock. The owner of the business is Major F. G. Brown, late R.A.F. This gentleman saw considerable service in Egypt in the R.A.F., was awarded the O.B.E. and the Order of the Nile. In an interview with our representative, he wished to be remembered to his many friends in the War R.A.F., and told us that his chief difficulty is the apparent impossibility of getting a telephone. To facilitate communication he hopes to have the telegraphic address "Buster Sheffield" registered immediately, for the origin of which in 1916 he is indebted to (then) Major de la Ferté!

A COMMUNICATION has just been received by Messrs. Rolls-Royce, Ltd., from Mr. J. P. Holland, Motor Correspondent, on the subject of the flight from England to South Africa by Lieut.-Col. Sir H. A. Van Ryneveld, K.B.E., in a Vickers-Vimy-Rolls-Royce machine. Mr. Holland writes as follows: "There have been so many and contradictory reports of the Cairo to Cape air trip, that I was glad of the opportunity the other day of meeting Col. Sir Hesperus Van Ryneveld, K.B.E., who piloted the Vickers-Vimy-Rolls-Royce machine from north to south of Africa. His story of the trip would fill a book and tax the descriptive genius of a Boyd Cable. The point which interested me was his statement that the involuntary descent at Bulawayo was in no way due to engine trouble, but that, on the contrary, the Rolls-Royce engines were running as smoothly as ever, even when the crashed machine was picked up at Bulawayo."

The distance from London to Cape Town by the route it was intended to take is 7,606 miles. Of this distance the machine had already covered 6,281 miles.

THE Murray-Willat Motor and Aeroplane Corporation, formerly of New York City, have transferred their operations to the Pacific Coast with headquarters in Los Angeles. They will continue the manufacture of their two-stroke rotary and radial motors, and are developing a small all-metal biplane.

NEW COMPANY REGISTERED

MOTOR AND AVIATION CO., LTD., 181, Wardour Street, Oxford Street W.—Capital £1,000, in £1 shares. Manufacturers of, and dealers in, motor-cars, etc., airships, aeroplanes, etc. First directors: F. H. Fowler and J. F. Fowler.

PUBLICATIONS RECEIVED

Report No. 64. *Experimental Research on Air Propellers*, III. National Advisory Committee for Aeronautics, Navy Building, 17th and B Streets, N.W., Washington, D.C., U.S.A.

The Aeronautical Directory of the World. London: The Aeroplane and General Publishing Co., Ltd., 61, Carey Street, W.C. 2. Price 21s. net.

Technical Note No. 1: Notes on Longitudinal Stability and Balance. By E. P. Warner. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

Report No. 70: *Preliminary Report on Free Flight Tests*. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

AERONAUTICAL PATENTS PUBLISHED

Abbreviations: cyl. = cylinder; I.C. = internal combustion; m. = motor

APPLIED FOR IN 1916

The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

Published June 10, 1920.

12,152. J. V. MARTIN. Aerodynamic stabiliser. (142,872.)

APPLIED FOR IN 1919

The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

Published June 10, 1920.

587. S. G. BROWN. Gyro-compasses. (142,894.)

4,002. A. WELLINGTON. Controlling, steering, etc. of flying boats, etc. (142,943.)

4,295. T. E. RICHARDS. Structures for housing airships. (142,948.)

15,801. J. J. LAST. Inclometers. (143,077.)

17,905. E. G. RALCH. Lamp signalling device for aeroplanes. (143,095.)

21,876. H. N. H. COBOLD and POTHOLME AIRCRAFT CO. Electric plugs. (143,115.)

APPLIED FOR IN 1920.

The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

Published June 10, 1920.

7,014. G. THOFERN. Airship hangars. (140,073.)

If you require anything pertaining to aviation, study "FLIGHT's" Buyers' Guide and Trade Directory, which appears in our advertisement pages each week (see pages xxiv, xxv and xxvi).

NOTICE TO ADVERTISERS

All Advertisement Copy and Blocks must be delivered at the Offices of "FLIGHT," 36, Great Queen Street, Kingsway, W.C. 2, not later than 12 o'clock on Saturday in each week for the following week's issue.

FLIGHT

The Aircraft Engineer and Airships

36, GREAT QUEEN STREET, KINGSWAY, W.C. 2.

Telegraphic address: Truditur, Westcent, London.

Telephone: Gerrard 1828.

SUBSCRIPTION RATES

"FLIGHT" will be forwarded, post free, at the following rates:—

UNITED KINGDOM		ABROAD	
	s. d.		s. d.
3 Months, Post Free..	7 1	3 Months, Post Free..	8 3
6 " " " " " "	14 1	6 " " " " " "	16 6
12 " " " " " "	28 2	12 " " " " " "	33 0

These rates are subject to any alteration found necessary under abnormal conditions.

* European subscriptions must be remitted in British currency.

Cheques and Post Office Orders should be made payable to the Proprietors of "FLIGHT," 36, Great Queen Street, Kingsway, W.C. 2, and crossed London County and Westminster Bank, otherwise no responsibility will be accepted.

Should any difficulty be experienced in procuring "FLIGHT" from local news-vendors, intending readers can obtain each issue direct from the Publishing Office, by forwarding remittance as above.